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E. J. Warwick.

UNITED STATES DEPARTMENT OF AGRICULTURE

AGRICULTURAL RESEARCH SERVICE

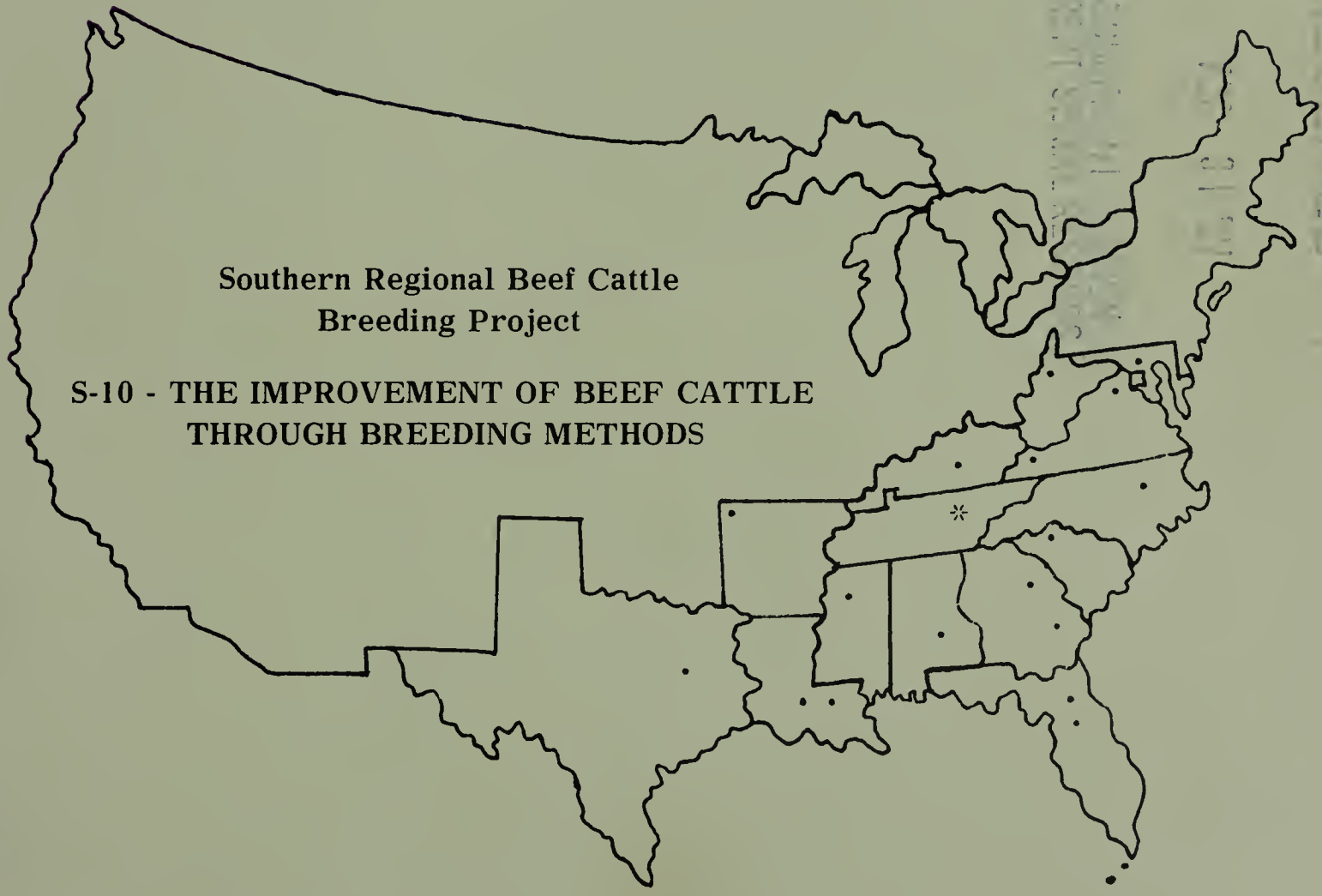
ANIMAL HUSBANDRY RESEARCH DIVISION

and

COOPERATING SOUTHERN STATES

1961-1962 Annual Report of S-10
and
Report of Annual Meeting of Technical Committee

Auburn, Alabama
June 24 - 27, 1962



This report is intended for the use of administrative leaders and workers and is not for general publication.

S-10 - 1961 ANNUAL REPORT

CONTENTS

PERSONNEL OF THE S-10 PROJECT

I. Technical Committee:

Alabama	T. B. Patterson
Arkansas	C. J. Brown
Florida	Marvin Koger
Georgia	W. C. McCormick
Kentucky	N. W. Bradley
Louisiana	N. C. England
Maryland	W. W. Green
Mississippi	C. E. Lindley
North Carolina	E. U. Dillard
South Carolina	W. C. Godley
Tennessee	C. S. Hobbs
Texas	T. C. Cartwright
Virginia	T. J. Marlowe
West Virginia	H. E. Kidder

II. U. S. Department of Agriculture:

E. J. Warwick, Chief, Beef Cattle Research Branch, AHRD, ARS, Beltsville, Maryland
R. S. Temple, Regional Coordinator, S-10
W. C. Burns, Superintendent, West Central Florida Experiment Station, Brooksville, Florida
J. W. High, Superintendent, Iberia Livestock Experiment Station, Jeanerette, Louisiana
B. M. Priode, Superintendent, Beef Cattle Research Station, Front Royal, Virginia
M. J. Burris, Animal Geneticist, CSESS, Washington, D. C.

III. Regional Officers - 1962

R. E. Patterson, Administrative Advisor, College Station, Texas
W. C. Godley, Chairman, Clemson, South Carolina
W. C. McCormick, Secretary, Tifton, Georgia
T. B. Patterson, Executive Committee Member, Auburn, Alabama

INTRODUCTION

This project was initiated in 1948 to investigate and develop methods of breeding more productive beef cattle for the South. Detailed Annual Reports showing research developments and progress in each state have been prepared each year since 1950.

This publication includes the proceedings of the 1962 Annual Meeting of the S-10 Technical Committee and the annual reports of projects in each of the 13 cooperating states. The annual reports of S-10 contributing and supporting projects were prepared by the project leaders and other personnel at the various stations as summaries of the research developments and progress at each station duirng 1961. The results are not considered final, but the material will aid cooperators and the Regional Coordinator in developing an integrated program. This report also provides information needed by heads of Animal Husbandry Departments, Experiment Station Directors, and U. S. Department of Agriculture officials for evaluation of the projects with respect to objectives and procedures. This report is not for general distribution and material contained in it should not be quoted in publications.

SCOPE OF THE PROJECT AND RECENT DEVELOPMENTS

Agricultural Experiment Stations in 13 states and the Animal Husbandry Research Division of the Agricultural Research Service, United States Department of Agriculture, had active contributing projects in the S-10 Southern Regional Beef Cattle Breeding project in 1961. Experimental cattle were maintained at 36 experiment stations and substations in the Region. Thirty-three of these were state-owned and three were federally owned. The three federally owned stations are located at Jeanerette, Louisiana; Brooksville, Florida; and Front Royal, Virginia. These were operated cooperatively with the state in which they were located. An inventory taken on July 1, 1962, indicated that there were 12,304 head of beef cattle in research herds at the stations in the project. This included 5915 cows and heifers over two years of age, 1365 yearling heifers, 3964 calves under 12 months of age, 576 bulls over 12 months of age, and 484 steers over 12 months of age. These numbers indicate approximately a 12 percent decrease in the inventory from that of July 1, 1961. This decrease in total inventory is due mainly to changing over of projects due to revision at some of the stations.

Postweaning and grazing tests included 679 young bulls, 1095 heifers, and 610 steers. Of the young bulls fed out, approximately 59 percent were fed on a cooperative basis with beef cattle breeders. Some of these young bulls, both station owned and breeder owned, went into experimental herds, as well as back into the breeders' herds.

Several breeds of beef cattle are continuing to be studied in this Region, both as purebreds and in crossbred combinations. There were approximately 70 different breed combinations with respect to the fraction of breed in each kind. The breeds being studied in this area are Angus, Hereford, Shorthorn, Brahman, Santa Gertrudis, Polled Hereford, Red Poll, Charolais, Sindhi, and inter se strains of Africander-Angus and Brahman-Angus. In several of the crossbreeding projects, reciprocal crosses are being made so

as to estimate the heterotic effect. The study of crossbreeding involves backcrossing, three-breed crossing, four-breed crossing, and rotational crossing, in addition to single crosses. Carrying the crossbreeding studies past the single-cross stage is important so as to have some idea of whether a single-cross mother is any better than a three-breed cross, four-breed cross, backcross, and so forth.

Continued emphasis has been placed on the development of more precise methods of beef cattle improvement with respect to performance characteristics, such as growth rate, efficiency, milking ability and cow productivity, adaptation to environmental conditions, and quality of meat. The latter characteristic continued to receive increased interest in cooperative investigations which tied together beef cattle breeding and meats research at eleven institutions.

SUMMARY OF RESEARCH RESULTS DURING THE YEAR

The research results in the S-10 project are cumulative and are of a continuing nature, since the beef cattle breeding projects cover a period of several years. Several of the contributing projects have been in force for several years, and results are forthcoming, while other projects are being revised and some new projects are being initiated.

1. Cow Productivity (see Appendix, Tables 5, 6, 7, and 8)

Of 5463 cows being exposed in breeding herds of contributing projects in 1960, 4508 - or 82.5 percent - remained in the herd up to calving time. Approximately 70 percent of the cows removed from the breeding herds before calving were removed for reproductive causes. Of the total number of cows exposed at breeding time, 64.9 percent weaned calves. This is in contrast to a figure of 72.2 percent of the cows exposed that gave birth to calves. Calf mortality up to weaning time amounted to 8.1 percent. Approximately 71.3 percent of the calves that died before weaning died during the first 36 hours or were dead at birth. Calf mortality up to weaning time was somewhat greater in straightbreds, 9.3 percent, than in crossbreds, 6.6 percent. Age of dam seems to have an effect on calf mortality. In the straightbred dams, calf mortality amounted to 17, 11, 10 and 8 percent, respectively, for yearlings, two-year-old, three-year-old and four-year-old and over dams. There appear to be large breed differences in calf mortality, but in some cases the breed of dam and location are confounded. Calf mortality figures for crossbred dams by age are 12.5, 7.6, 9.0 and 5.3, respectively, for yearlings, two-year-olds, three-year-olds and four-year-old and over. Cows bred when raising a calf had a 10 percent higher conception rate than the dry cows. As in the past, Brahman-type cows had a higher conception rate when dry than British cows and the British cows had a higher conception rate when raising a calf than the Brahman cows.

Studies on milk production of beef cattle are being continued at three stations. It appears from these studies that there are breed differences in milk production and that there is a significant relationship between milk production and calf gains. In a study at the Alabama station it appears that milk production, per se, is more important than any of the other component parts affecting slaughter grade. Data from this station indicate that heritability of milk production estimated on a within-sire intra-class correlation basis was approximately .33 for Angus and .46 for Herefords. When estimated on a paternal half-sib basis, these estimates were considerably higher. At the Jeanerette station, where the calves were removed from the cow for a 12 to 16 hour period, then weighed, allowed to nurse, and weighed again, the Sindhi and Brangus cows appeared to be highest in milk production. The Angus and Africander-Angus cows were intermediate and the Brahman cows were lowest. There was little difference in milk production of cows nursing straightbred and those nursing crossbred calves. In this study, cows that were five years of age and older consistently gave more milk than three to four year olds. It appears from these studies and other non-contributing projects that milk production in beef cattle is heritable and that progress in increasing milk production could be made by selecting calves with heavier weaning weights. Further work on this aspect will be continued at these and other stations.

In view of the low reproductive rate of beef cattle in the Southeastern United States, there has been an increased amount of interest in the study of reproduction problems in beef cattle. A study at the Mississippi station is being carried on in an effort to determine why certain cows fail to conceive. A study at the Jeanerette station on cows that failed to become pregnant in the regular breeding season revealed that a large percentage - 61.5 - of these cows became pregnant within a 42 day period after weaning calves. This was compared to a similar study the year before where during the same length of time 73.3 percent became pregnant. There was a higher percentage of older cows becoming pregnant during this period than two-year-old heifers.

The age at which heifers first come into heat has been studied in different breeds at two stations. It has been revealed that the British breeds come into heat earlier than the Zebu breeds. Data from the Baton Rouge, Louisiana station have indicated that the effect of age of puberty was additive in crossbred females, which does not agree with a recent study at the Fort Robinson, Nebraska station. The crossbreeding data at the Nebraska station, involving Angus, Hereford and Shorthorn, showed that the crossbred heifers came into heat for the first time earlier than the average of the straightbreds.

2. Growth Rate

Heritability estimates for growth rate from birth to weaning continue to indicate that there are genetic differences between sires. However, information from 1448 calves from 29 Angus, 39 Hereford and 16 Shorthorn sire groups from the Mississippi station indicate that the heritability estimates for growth rate from birth to weaning might be lower than has been previously indicated. When analyzed within breed, these data indicated that heritability for growth rate for Angus was .10, Herefords were .23, and Shorthorns were .12. Heritability estimates of weaning weight were .17 for Angus, .45 for Hereford and .15 for Shorthorn.

Data on the progeny of high and low gaining sires from two different stations indicate that the average of the progeny of the two groups for growth rate will be ranked the same way as the sires themselves.

Continuing data on creep-feeding in this area indicate that growth rate can be increased from birth to weaning by creep-feeding, depending to a great extent on pasture conditions. In most studies, however, creep-feeding has not been economical in the Southeastern United States. Gain data from the Texas station have indicated that calves averaging 1000 pounds in 365 days or less can be produced if nutritional and management conditions are optimized. The Texas station is also studying feed efficiency. They have indicated that differences in weight, rate of gain and level of feed consumption often make interpretations of feed efficiency data difficult. When daily feed consumption was equalized among calves they were able to show that average daily gain on test was quite variable, even though initial weight on test was fairly equal.

Data are continually being collected and analyzed on environmental factors which affect calf weights and gains. Adjustments for sex of calf have recently been estimated at the Alabama station. This study showed that bulls, on the average, were 23 pounds heavier than steers and heifers were 47 pounds lighter than steers. The Mississippi station reports that they found that steers weighed approximately 22 pounds more at weaning than heifers and that the male calves weighed 4.3 pounds heavier, on the average, at birth than females. A cooperative study by Texas and Virginia revealed that location had a significant influence on performance records of calves from the two states' Beef Cattle Improvement programs. This study was not conclusive, however, in whether or not the same growth adjustment factors could be used in the same locations.

3. Beef Quality

Most all of the stations have incorporated beef carcass work with their breeding programs. Estimates of the edible portion of the carcass, as well as dressing percent, fat thickness and tenderness measurements are being obtained in most cases. Some stations are doing considerable work on carcass breakdown, as well as factors which affect tenderness, juiciness and over-all acceptability of the carcass. There has been considerable effort to devise some means to estimate the total amount of lean or edible portion

of the carcass. The Texas station has derived mathematical equations for estimating the amount of lean in the carcass using carcass weight, percent kidney fat, thickness of fat over the ribeye and loin eye area. Equations have also been developed by the Tennessee station using rib fat thickness and carcass weight, as well as other factors.

4. Breeding Systems

Studies on inbreeding of beef cattle are being continued at three stations. Data from the Front Royal station, where inbreeding is being carried on in several lines and breeds, indicate that inbreeding effects may be more detrimental to females than to males, as far as birth weight and daily gain to weaning are concerned. Data from this station also shows a depressing effect of inbreeding on conception rate.

A large amount of the long-term breeding work in this region continues to be on crossbreeding. There are several comparisons of crossbreeding systems, such as single-crossing, back-crossing, three-breed crossing, rotational crossing and grading up. Limited data indicate that some of the hybrid vigor is lost in a back-crossing program as compared to single crosses where growth rate is considered. This appears to be true, also, in a continued back-crossing program.

A recent review of the crossbreeding work in the Southeastern United States indicated that maternal ability, as measured by growth rate of calves from birth to weaning, was better in the British-Brahman crossbred dams than the straight Brahmans and much better than the average of the British dams. Crosses between British and Brahman types were significantly heavier at birth than the average of the two parental types. Heterosis for birth weight from crosses among British breeds was small and averaged about two percent. With crosses among the British breeds, heterosis for growth rate from birth to about 15 months of age was about four percent. Limited data at one station suggested a slight decrease in growth rate for back-crosses and a slight increase over first crosses for three-breed crosses. First crosses between British and Brahman types showed 11.5 percent heterosis for growth rate from birth to about fifteen months of age. Straight British calves grew about seven percent faster than straight Brahmans. Backcrosses to the British type were more effective than backcrosses to the Brahman type in keeping growth rate near the level achieved in the first cross. Carcass traits not directly related to growth rate showed little evidence of heterosis in crosses and usually were near the average of their parents.

5. Genetic-Environmental Interaction Studies

There have been some indications for a long time that some breeds perform better in one environment than another. Recently, two studies have been initiated in the Southern Region to try to arrive at estimates of the magnitude of this genetic-environmental interaction. A North Carolina experiment is utilizing four locations within the state and different treatments at each location to evaluate how the progeny of sires react to different conditions. They are utilizing artificial insemination so that

the same sires can be used in different treatments and different locations each year. An inter-regional study has been initiated using cattle from Miles City, Montana, and Brooksville, Florida. Cattle from Miles City have been transferred to Brooksville. Additional transfers will be made this year to evaluate how Miles City, Montana, cattle selected for that area respond to selection in Florida, and vice versa. This is the first year for this project.

6. Dwarfism

Dwarfism studies are being continued at three stations in the Southern Region: Texas, Tennessee and Florida. The Florida station has concluded that the compact animal, known in Florida as the "guinea" is the heterozygote for the dexter bulldog gene. They have also indicated that there is some genetic or physiological relationship between the guinea and the snorter dwarf since crossing them has resulted in a dexter bulldog and numerous resorptions. Their work has also indicated that the Brahman carries the snorter gene and the midget is probably the heterozygote for the snorter dwarf gene. The Florida work indicates that mixed breeding may modify the expression of dwarfism. Cooperative work with the medical school at that station in acid mucopolysaccharidosis in dwarfs continues. X-ray and measurement work at the Tennessee station is being continued on animals of known genotype. Carbazole and napthoresorcinal tests for hexuronic acids in the urine will be made on carrier and clean calves. The Texas station is continuing their work on the relationship of amino acid metabolism to mucopolysaccharide accumulation in dwarf carrier and clean animals.

FUTURE PLANS

The S-10 Project and the contributing projects were reviewed critically at the annual meeting of the Technical Committee this year. There have been some suggestions as far as revision of parts of the Regional project. These are to be considered by a committee appointed by the Chairman of the Technical Committee and suggestions will be made by this committee at the next annual meeting.

Most of the contributing projects are of a long-time nature and general changes in them are not contemplated. There is continued emphasis on measurement of beef quality and carcass work. An ultrasonic animal scanning device has been purchased by the Agricultural Research Service and will be used in conjunction with contributing projects. It will be used on animals to be slaughtered and additional data on its utilization will be collected. If its use is found beneficial in estimating fat thickness and the edible portion of the carcass, it will undoubtedly be used on breeding animals in connection with selection experiments and programs.

There is continued new emphasis on reproductive performance and causes of low fertility in beef cattle in the Southern Region. Nutritional, as well as genetic effects on reproductive performance will be studied in new projects.

The present project at the Jeanerette, Louisiana station will reach its completion after the present breeding season. Ideas for revision of that project are being studied at present.

The genetic-environmental interaction study at Brooksville, Florida, in cooperation with the Miles City, Montana station has been initiated with females being transferred from the Miles City station to Brooksville in the fall of 1961. Further transfers will be made in the near future.

PUBLIC INTEREST IN THE PROGRAM

Data arising from the S-10 Regional Beef Cattle Breeding Project have been used in various phases of improvement of beef cattle in the South. Growth rate data and factors affecting growth rate, as well as carcass information, have been utilized by the Performance Registry International in setting standards for registry in their organization.

Techniques for the improvement of beef cattle developed in this project have been used in beef cattle improvement programs throughout the Southeastern United States. It is estimated that there are approximately 1750 herds on production testing in the Southeastern United States involving over 125,000 head of breeding cows. Testing stations for the measurement of feed-lot performance of young bulls have continued to increase in most states and this is utilized as a wonderful educational tool. The increased number of on-the-farm testing of young bulls has been noted. Most of this performance testing is under the supervision of the Agricultural Extension Service in the respective states. Data from the S-10 breeding project were reported at over 45 field days at which good attendance was reported, reflecting growing interest in the application of the newer tools by cattle breeders.

Many popular articles in farm magazines have reached the public. These articles stimulate interest and prompt requests for further information on many of the experiments.

PROGRAM
S-10 TECHNICAL COMMITTEE MEETING
June 24-27, 1962

June 24

Assemble at Selma, Alabama - Graystone Motel
8:00 p.m. Executive Committee meeting

June 25

8:00 a.m. Tour of Black Belt Substation - T. B. Patterson presiding
11:30 a.m. Lunch
3:30 p.m. Arrive Auburn University. Tour of North Auburn Beef Unit
7:00 p.m. Dinner, Dairyland Farms - W. D. Salmon speaker

June 26

Funchess Hall, Auburn University, W. C. Godley, Chairman, presiding
8:00 a.m. Welcome, E. V. Smith, Director of Experiment Station
Introductions and announcements
8:30 a.m. Review of the S-10 Project and Its Objectives - R. S. Temple
9:45 a.m. A Look at Regional Research and the S-10 Project - R. E. Patterson, Administrative Advisor
10:25 a.m. Contributions and Possibilities of the S-10 Project as a Part of Beef Cattle Breeding Research - E. J. Warwick, Chief, Beef Cattle Research Branch, AHRD, ARS
11:15 a.m. Challenges for the Future in Breeding Research - J. E. Legates, Head, Animal Breeding Section, Animal Industry Department, North Carolina State College
12:00 Lunch
1:00 p.m. Committee reports:
Data Analysis and Processing - T. B. Patterson, Chairman
Projects and Collection of Data for S-10 - C. J. Brown, Chairman
Standardization of Carcass and Meat Studies - C. S. Hobbs, Chairman
2:30 p.m. Station reports:
Alabama
Arkansas
Florida (U. of F.)
Florida, Brooksville
4:30 p.m. Tour of South Auburn livestock units, swine nutrition unit, swine breeding unit, sheep breeding unit, and meats laboratory
6:30 p.m. Dinner and business meeting - W. C. Godley, Chairman, presiding

June 27

8:00 a.m. Station reports:
Georgia
Kentucky
Louisiana (LSU)
Louisiana, Jeanerette
11:00 a.m. Summary by Chairman
11:30 a.m. Adjourn

1:00 p.m. Optional workshop for discussion of analysis of data, collection of data for the S-10 project, individual problems with data, etc.

S-10 TECHNICAL COMMITTEE MEETING
Auburn, Alabama
June 24-27, 1962

The 1962 meeting of the S-10 Technical Committee was held at Auburn University, Auburn, Alabama, June 24-27 (see program for schedule of events).

Dr. W. C. Godley, Chairman, called the meeting to order. Dr. T. B. Patterson, Technical Committee member from Auburn, introduced Dean E. V. Smith, Dean of the School of Agriculture and Director of the Experiment Station, Auburn University, who welcomed the group to the station.

Those attending the meetings were:

Name	Institution	State
T. B. Patterson*	Auburn University	Auburn, Alabama
W. M. Warren	Auburn University	Auburn, Alabama
C. J. Brown*	University of Arkansas	Fayetteville, Arkansas
Marvin Koger*	University of Florida	Gainesville, Florida
W. C. Burns	W. Central Fla. Exp. Sta.	Brooksville, Florida
R. W. Kidder	Everglades Experiment Sta.	Belle Glade, Florida
F. M. Peacock	Range Cattle Exp. Sta.	Ona, Florida
W. C. McCormick*	Ga. Coastal Plain Exp. Sta.	Tifton, Georgia
B. L. Southwell	Ga. Coastal Plain Exp. Sta.	Tifton, Georgia
J. L. Carmon	University of Georgia	Athens, Georgia
Britt Williams	University of Georgia	Athens, Georgia
Bob Renbarger	University of Georgia	Athens, Georgia
E. P. Warren	University of Georgia	Athens, Georgia
R. A. Long	University of Georgia	Athens, Georgia
Dale Redeker	University of Georgia	Athens, Georgia
Walter Neville, Jr.	Georgia Experiment Station	Experiment, Georgia
H. C. McCampbell	Georgia Experiment Station	Experiment, Georgia
N. W. Bradley*	University of Kentucky	Lexington, Kentucky
Noah England*	Louisiana State University	Baton Rouge, Louisiana
G. L. Robertson	Louisiana State University	Baton Rouge, Louisiana
S. H. Fowler	Louisiana State University	Baton Rouge, Louisiana
J. C. Glenn	Louisiana State University	Baton Rouge, Louisiana
B. R. Farthing	Louisiana State University	Baton Rouge, Louisiana
J. W. High	Iberia Livestock Exp. Sta.	Jeanerette, Louisiana
T. M. DeRouen	Iberia Livestock Exp. Sta.	Jeanerette, Louisiana
W. L. Reynolds	Iberia Livestock Exp. Sta.	Jeanerette, Louisiana
Bryan Baker	Mississippi State University	State College, Miss.
E. U. Dillard*	North Carolina State College	Raleigh, North Carolina
Hayes Gregory	North Carolina State College	Raleigh, North Carolina
J. E. Legates	North Carolina State College	Raleigh, North Carolina
W. C. Godley*	Clemson College	Clemson, South Carolina
C. S. Hobbs*	University of Tennessee	Knoxville, Tennessee
R. J. Cooper	University of Tennessee	Knoxville, Tennessee
Haley Jamison	University of Tennessee	Knoxville, Tennessee

Name	Institution	State
T. C. Cartwright*	Texas A and M College	College Station, Texas
Richard Thomas	Texas A and M College	College Station, Texas
G. F. Ellis, Jr.	Texas A and M College	College Station, Texas
R. E. Patterson**	Texas A and M College	College Station, Texas
T. J. Marlowe*	Virginia Polytechnic Institute	Blacksburg, Virginia
K. P. Bovard	Beef Cattle Research Station	Front Royal, Virginia
G. C. Anderson	West Virginia University	Morgantown, West Virginia
Luis Rivera-Brenes	University of Puerto Rico	Rio Piedras, Puerto Rico
K. E. Gregory	USDA, ARS, Regional Coord.,W-1	Lincoln, Nebraska
M. J. Burris	USDA, CSESS	Washington, D. C.
E. J. Warwick	USDA, ARS, AHRD	Beltsville, Maryland
D. O. Everson	USDA, ARS, AHRD	Beltsville, Maryland
R. S. Temple	USDA, ARS, AHRD, Regional Coordinator, S-10	Knoxville, Tennessee

* Technical Committee members

** Regional Administrative Advisor, S-10

MINUTES OF S-10 EXECUTIVE COMMITTEE MEETING
8:00 p.m., June 24, 1962
Selma, Alabama

Executive Committee Chairman - W. C. Godley presiding

Others present - R. E. Patterson, E. J. Warwick, M. J. Burris, R. S. Temple, T. B. Patterson, and W. C. McCormick

Chairman Godley announced that the Resolutions Committee would be as follows:

N. W. Bradley, Chairman
Marvin Koger
K. P. Bovard

The Executive Committee reviewed and discussed the plans and program for our present meeting. T. B. Patterson and R. S. Temple filled in all details pertaining to this meeting. The Executive Committee approved T. B. Patterson's arrangements in reference to Tuesday night dinner.

The Executive Committee asked T. C. Cartwright to send a telegram to Dr. A. O. Rhoad's family expressing our sympathy for their loss.

The Executive Committee recommends to the Technical Committee that we do not revise publication of the 10-year summary. It was agreed that a limited number of copies of this report could be obtained from the Regional Coordinator upon request of the technical committeemen, and that such requests should be made in the near future.

The Executive Committee further recommends to the Technical Committee that the Regional Coordinator explore the possibilities of preparing a popular type release giving the history, objectives, and accomplishments of S-10 to date for consideration as a publication.

The Regional Coordinator asked for information in reference to procedure for presenting papers at recognized meetings. This was discussed at length and the Executive Committee recommended that permission be granted. The Executive Committee further recommended that the details of this discussion be reviewed with the Technical Committee before action is taken.

Respectfully submitted,

W. C. McCormick
Secretary

MINUTES OF S-10 TECHNICAL COMMITTEE MEETING
June 26-27, 1962
Auburn, Alabama

Chairman Godley pointed out that minutes of last year's meeting and of the Executive Committee meeting at Jacksonville, Florida, had been circulated to the Technical Committee and asked if the Committee wished to have them read. Koger moved that they be approved as circulated, Hobbs seconded the motion, and the minutes were accepted as circulated.

Minutes of the Executive Committee meeting held at the Greystone Motel were read and approved.

Chairman Godley introduced Noah England as the new Technical Committee member from Louisiana State University and T. J. Marlowe as the new member from Virginia. Chairman Godley also pointed out that Dr. Baker and Dr. Anderson would be representing Technical Committee members from Mississippi and West Virginia, respectively.

Chairman Godley announced that T. C. Cartwright had won one of the distinguished teacher awards at Texas A and M College.

Chairman Godley asked for action in reference to the Executive Committee's recommendation pertaining to publishing the 10-year summary. Koger moved that action of the Executive Committee be approved, Brown seconded the motion, and the motion was passed.

T. R. Patterson led a discussion on the report by the Data Analysis and Processing Committee. Patterson recommended that the Technical Committee grant permission to collect data as outlined in the afternoon questionnaire. J. L. Carmon suggested that each laboratory write a descriptive paragrpah of each IBM program available. Britt Williams suggested that the Technical Committee also list types of programs needed. Hobbs seconded the motion, and permission was granted.

C. J. Brown led a discussion on the report by the Projects and Collection of Data Committee. Brown moved that we accept the forms as outlined and wait for further information on the present fertility data study before revising the fertility forms. Chairman Godley asked that the present committee remain in force, Bradley seconded the motion, and the motion passed.

C. S. Hobbs presented a discussion of the report by the Standardization of Carcass and Meat Studies Committee. Hobbs moved that we adopt bare minimum requirements as outlined in the 1960 Annual Report, provided that they are in line with the recommendations of the reciprocal meats conference, and further recommended that a USDA grader be used instead of a meats man. Koger seconded the motion, and the motion was passed.

Recommendation was made and approved that the Coordinator be given permission to check and coordinate values obtained with shear machines.

The recommendation in reference to preparing popular articles of the history, objectives, and accomplishments of S-10 (as approved by the Executive Committee) was considered. Marlowe made the motion that the recommendation be accepted, Koger seconded, and the motion passed.

The recommendations of the Executive Committee pertaining to the Regional Coordinator presenting papers was considered. Marlowe made the motion that we grant the Regional Coordinator this request in line with this discussion, provided that he get permission from each technical committeeman with data involved, and that approval be obtained from the Executive Committee on papers, abstracts, and titles before proceeding.

C. S. Hobbs amended the motion to read - That the title and abstract be sent to the Technical Committee members and the Regional Administrative Advisor two weeks prior to submission and get final approval for the paper itself from the Regional Administrative Advisor and the Chairman of the Executive Committee before proceeding with the paper. Notification of approval or disapproval of title and abstract by Technical Committeemen will be directed to the Coordinator with copies of such correspondence being sent to the Regional Administrative Advisor and the Chairman of the Executive Committee. On the basis of information received, the Regional Administrative Advisor and the Chairman of the Executive Committee would make their decision. The motion was seconded by T. B. Patterson. Motion passed.

Following a discussion by the Regional Coordinator, a motion was made by Koger and seconded by Dillard that permission be granted the Coordinator's office to use regional data for thesis material, provided that clearance with the usual restrictions be considered. Motion possed.

The report submitted by the Resolutions Committee was:

BE IT RESOLVED that the committee express its appreciation to Mr. L. A. Smith and his staff at the Black Belt Substation for the well-planned, informative, and hospitable tour of their station at Marion Junction, Alabama.

BE IT ALSO RESOLVED that the committee extend its sincere thanks to Dr. T. B. Patterson, Dr. W. M. Warren, and the entire staff of the Animal Science Department of Auburn University for their excellent and convient arrangements and interesting tours of the facilities at Auburn.

BE IT FURTHER RESOLVED that the S-10 Technical Committee extend its special thanks to Dr. W. D. Salmon for a stimulating and enlightening discussion of highlights of his research.

THE COMMITTEE RECOMMENDS that a copy of these resolutions be sent to Dr. E. V. Smith, Dean and Director of the Agricultural Experiment Station of Auburn University.

BE IT RESOLVED that the committee express its thanks for the hospitality of the Alabama Cattleman's Association for providing an excellent and appropriate dinner for those attending the S-10 meeting, and that a copy of these resolutions be sent to the President and to the Executive Vice President of the Alabama Cattleman's Association.

Following a motion by T. B. Patterson and a second by T. C. Cartwright, the report was accepted.

T. J. Marlowe extended an invitation for the group to meet in Virginia in 1963.

N. W. Bradley extended an invitation to the group to meet in Kentucky in 1963.

Bryan Baker extended an invitation to the group to meet in Mississippi in 1964.

Following a motion by Koger and a second by T. B. Patterson, the group voted to accept the invitation of Virginia.

E. U. Dillard was elected as the new member of the Executive Committee.

Chairman Godley appointed a committee consisting of T. C. Cartwright, Chairman; R. S. Temple; C. J. Brown; and W. C. McCormick to take all suggestions offered by the Technical Committee, to revise our regional project if deemed necessary, and to submit this revision to the Technical Committee for consideration and possible adoption.

Respectfully submitted,

W. C. McCormick
Secretary

A LOOK AT THE S-10 BEEF CATTLE BREEDING PROJECT AND ITS CONTRIBUTING PROJECTS [1, 2]

It is necessary from time to time to take a critical look at a project, to review what its objectives are, and to see what it has done. It is the purpose of this discussion to review the objectives of the S-10 Project and how the contributing projects' objectives fit into the regional project. It is also of interest to study the possibilities of where the regional project might be more effective. Table 1 indicates where, in my opinion, the objectives of the state projects fit into the regional project. These include the present projects now listed as contributing projects. In Tables 2 and 3, a summary has been made so that a quicker view can be taken as to where these objectives and future work fit in.

There is no doubt that our regional project and the contributing projects have made contributions through the past fourteen years of their existence. These have been indicated in the Ten-Year Progress Report and the recent bulletin, "Breed Crosses with Beef Cattle in the South", which was published under the Southern Cooperative series. But for purposes of our discussion here, it would be interesting to list the contributions of each state project under the appropriate objective of the S-10 project. This is attempted in the section entitled "Contributions of State Projects to the S-10 Project." A summary of these contributions is shown in Table 4. In line with these contributions, there have been well over 200 publications, including technical articles and theses, in the past twelve to fourteen years.

A summary of this kind may help show where we are strongest and, to some extent, where we are the weakest so that we can make our regional project and the contributing projects stronger.

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[1] Presented to the S-10 Technical Committee, 1962, at Auburn University by the Regional Coordinator, R. S. Temple.

[2] For Tables referred to above, see Appendix Tables 1 - 4.

CONTRIBUTIONS OF STATE PROJECTS TO THE S-10 PROJECT
Summarized from Project Statements, 1961

S-10 Project, Objective 1: To develop methods, selection criteria and procedures which will result in beef cattle capable of higher productive efficiency and superior market qualities of product.

Alabama: Hatch 525

Little selection pressure in females from 1951 to 1956. Some effective selection pressure in females since 1956, but, to date, insufficient numbers have produced progeny to properly evaluate the effective selection or to evaluate relative importance of each characteristic.

Data are now available for estimating heritability, repeatability and genetic correlations for growth rate, grades and milk production of dams.

Arkansas: Hatch 170

Several different aspects of evaluating beef cattle performance have been dealt with. Estimates of repeatability of visual scores by the same judge on the same cows over the entire lifetime have been estimated to be between .4 and .6. Temporary and permanent environmental circumstances influence type scores. Heritability of type has been estimated at thirty-three percent. The response to selection for type has been slow. Visual scores have been, in general, lowly correlated with such characteristics as mothering ability, feedlot performance of young bulls, body measurements, fertility of bulls, and carcass quality. Growth and development patterns for weight and body measurements have been studied. Heritability of weaning weight estimated to be around twenty-six percent. There seems to be a difference in heritability estimates of Hereford and Angus cattle. Heritability estimates based on parental half-sib method of body measurements were made.

Studies on milk production of beef cows and pre-weaning growth of beef calves have been initiated. One-hundred-and-twenty day weight of calves as an indication of mothering ability has been recommended. Milk production in dam and such factors as lactation, number of mothering score, birth weight and suckling time of calf account for sixty to seventy-five percent of the variance in calf gain. Adjustment factors for year, season of birth, sex, sire and age of dam have been estimated.

Post-weaning performance of bulls has been studied and there is little relationship between feedlot performance and type of body measurements, semen quality or carcass desirability. Bulls and steers have been compared for seventy-six traits of performance, carcass cut-out and eating quality.

Florida: State 629

Due to lack of control populations, it has been difficult to evaluate with certainty what progress has been made genetically. However, it appears that the reproduction rate has been increased significantly in the Brangus herd, which cannot be explained on the basis of improved conditions or repeatability of reproduction. Marked improvement in gaining ability in

the Brahman, mainly through the influence of one sire, and in weaning weight of Herefords have been made.

Florida: Hatch 752

Snorter dwarfs, long-headed dwarfs, guineas or dexter dwarfs, midgets and compressed dwarfs have been studied and identified. Results of test matings suggest a possible interrelationship between the different types of dwarfism, the nature of which is speculative. Work has also been done on methods of detecting carrier animals through blood constituents, but the group differences were not discrete enough to prove the method as a diagnostic tool. It has been shown that mucopolysaccharides in the urine of snorter dwarfs are identical or similar to that excreted by human gargoyles.

Georgia: Hatch 209

This project is approximately one generation old. Little can be said, at present, as to differences in systems of breeding. Little selection is being practiced.

Louisiana: Hatch 605

Adjustment factors for environmental sources of variation have been estimated. These data suggest that there is little difference in weaning weights of calves from seven-year-old dams and older.

Mississippi: Hatch 642

A survey of the reproductive performance of herds in the experiment station system in Mississippi has revealed a large amount of variation in calving interval from herd to herd. Most of the variability in reproductive performance can be attributed to the use of low fertility or sterile bulls in some of the herds. Data have been collected on approximately seventy-five cows that had not calved after being exposed to bulls for two breeding seasons or that had not settled after repeated artificial matings. About twenty percent of these cows have conceived after being bred. In the other cows abnormalities such as cystic ovaries, hydrosalpinx, occuluded oviducts and missing anatomical parts have been observed. It appears that the major contributing factor to lowered fertility is early embryonic mortality. This can apparently be accredited to an imbalance of hormones necessary for the normal implantation of the ova or some other factors that may be operating during the early phases of cleavage of the ova. Diseases and microorganisms appear not to have had much influence on the reproductive performance.

Mississippi: Hatch 666

Lines of Hereford, Angus and Shorthorn cattle from eight states have been tested on unrelated cows. These data indicate line differences in several traits.

South Carolina: Hatch 479

From a limited amount of data, it appears that sire progenies differ not only in gaining ability, weight at a constant age, and type score, but also

in carcass traits studied. It appears that genotypic, as well as phenotypic, relationships between live animal and carcass traits need to be determined.

Tennessee: Hatch 61

Progeny tests on several bulls have been completed indicating large differences between sires. Comparisons between weights and grades at about four months and at weaning indicate a close relationship. Two sets of Hereford heifers have been exposed to different levels of irradiation.

Tennessee: Hatch 65

Pedigree-clean cows are being mated to dwarf and clean bulls each year. X-ray and body measurements are being taken. The use of X-ray to detect carrier animals has been proven to be about eighty percent accurate.

Texas: Hatch 650

Heritability estimates, feedlot rate of gain, and other production factors have been estimated and re-estimated. Progress in the selection herd has been essentially according to expectations from the more conservative estimates. No genetic control has been available to provide an estimate of environmental trends.

It has been found that production and heat tolerance, as measured, are not necessarily positively related. The conclusion has been drawn that measures of physiological response were of little or no benefit in selecting animals for increased productivity. Early carcass work indicated that large differences in carcass conformation between British and Brahman types were not to be found, especially when the carcasses were broken into cuts.

Significant interactions were found between breed, type and age of dam. Also, differences among weaning weights of different breed types were indicated.

Texas: Hatch 714

No definite relationship between blood factors and rate of gain. The development of the rumen is being studied.

Texas: Hatch 959

The test of tolerance to insulin for detecting the heterozygote of snorter dwarfism has proven to be of little use. Some differences have been noted among dwarf and normal animals as to the amount of free amino acid content of the blood plasma of fasted and non-fasted animals.

Virginia: State O-131-S

Growth rate and type were found to be genetically independent. Selection for either should not effect the progress in the other. Positive genetic correlations among pre- and post-weaning periods suggested selection at either time will be helped by similar selection during the other period. From data collected, it appears that mothering ability of the cow may be estimated best at 120 days of age. Growth and conformation of the calf may be best estimated at 180 days of age. Most effects of inbreeding are undesirable

Objective 2: To develop beef cattle with higher reproductive efficiency, greater longevity, and other aspects of lifetime productive efficiency.

Florida: State 629

Reproduction rate in Brangus cattle has improved, and there has been marked improvement in gaining ability of Brahman and weaning weight of Herefords.

Louisiana: Hatch 605

No significant differences have been found among breeds or crosses in calving percentage. By breed of dam, the Brangus had a higher percentage raised, which was followed by Brahman, Hereford and Angus. Where the purebreeds are concerned, the British breeds - Hereford and Angus - have slightly excelled the Zebu breeds in both percentage calves born and percentage raised. Brangus cows consistently raised calves that were considerably heavier than those raised by the other three breeds. Brahman cows weaned calves that had significantly heavier weights than did Angus and Hereford cows.

Mississippi: Hatch 666

Results for this objective have been reported under S-10 Objective 3.

West Virginia: Hatch 90

Breeding efficiency of a herd of purebred Hereford and Angus cows was not affected, insofar as conception rate was concerned, by the involutionary state of the uterus at the time of breeding. No breed differences have been noted. Conception rate of cows first bred prior to involution but not conceiving apparently was not impaired at second breeding. Conception rate at first service was significantly higher for those cows bred after seventy-nine days post-partum than for those cows bred previous to eighty days post-partum.

Louisiana (Jeanerette): AHRD L. P. d1-6

Differences in conception rate among Brahman-Angus, Brahman, and Sindhi cows, as well as Africander-Angus and Angus cows, have been noted. Conception is higher in Africander-Angus and Angus than in the other breeds. Mortality of calves during the first three days after birth is high for the Brahman-Sindhi and Brahman-Angus. Calves from Angus and Africander-Angus dams appear to be stronger at this time than calves of the other breed groups. Percent calves raised to weaning per cow bred was similar for Angus and Africander-Angus, which was higher than for the Brahman-Angus and the Brahman.

Objective 3: To develop beef cattle especially adapted to conditions in various environments of the Region.

General:

In essence, each state project is attempting to do this, although their specific objectives may not state this per se. There has, undoubtedly, been some improvement in many of the herds in various projects in their adaptation to their various environments. However, below are those projects that have indicated some specific adaptation or improvement.

Florida: State 390

In Brahman-European crosses the high level of hybrid vigor was maintained as long as the proportion of blood of the predominant breed did not exceed seventy-five percent. The average weaning weight of all crossbred calves was twenty-nine percent higher than for purebreds. Considering pre- and post-weaning data, the F_1's had a slight advantage over the other crosses. Beyond seventy-five percent of one breed, growth declined rapidly to that of the parent breed. In comparing crosses with more than fifty percent of one breed, those with a predominance of Brahman blood have had slightly better growth rate on pasture than those with a predominance of Shorthorn breeding. Reproductive efficiency as measured by weaning percent was eighty-six percent for F_1 cows, as compared to sixty-nine percent for other crosses and sixty-seven percent for purebreds. A group of grade Shorthorns descending from native and mixed breeding weaned an eighty-four percent calf crop, as compared to sixty-three percent for the purebred Shorthorns. In feedlot trials no significant difference has been reported in gain due to breed group. Carcass grade, marbling and tenderness score declined significantly with an increase in the proportion of Brahman blood. Brahman cows have produced at approximately the same rate on native, partially improved and highly improved pastures. All the various crossbred and Shorthorn cows showed progressive increases in production with improvement of pasture. Crossbred cows produced more than straightbred groups on all three programs.

Florida: State 629

A five year summary of data indicates that Angus and Hereford have reasonably satisfactory calving percentages of eighty-eight and eighty-one, respectively; while the Brahman, Brangus and Santa Gertrudis had lower rates of sixty-five, seventy-seven and sixty-six percent, respectively. Weaning weights were low for Angus and Hereford at 340 and 316 pounds, while the remaining groups averaged 355, 382 and 435 for Brahman, Brangus and Santa Gertrudis, respectively. Due to a lack of control populations, it is difficult to evaluate with certainty what has been done genetically in improving performance of the different herds. It appears, however, that reproduction rate has been increased significantly in the Brangus herd and cannot be explained on the basis of improved conditions or repeatability of reproductive performance, since the other herds have not shown such improvement. Marked improvement in gaining ability in Brahmans and Herefords has been made.

Louisiana: Hatch 605

Brangus cows raised calves that were considerably heavier than those raised by the other three breeds of cows, i.e. Angus, Brahman and Hereford. The Brahman cows weaned calves of significantly heavier weights than did Angus and Hereford cows. The value of part or all Brahman breeding for superior mothering ability under Southeastern conditions is clearly indicated. Charolais and Hereford bulls sired calves that were considerably heavier at weaning time than calves sired by bulls of the other four breeds, i.e. Angus, Brahman, Brangus and Shorthorn. Shorthorn and Brangus bulls performed nearly alike with respect to weaning weights, while Angus bulls consistently sired calves whose weaning weights were considerably below average. No significant differences have been found among the breeds in calving percentage. However, the Hereford sires averaged a higher percentage born than Charolais and Angus sires, while the Brahman, Shorthorn and Brangus sires were lower than the other three breeds. The Hereford sires had a higher percentage raised, which was closely followed by the Angus, Charolais, Shorthorn, Brahman and Brangus sires, in that order. By breed of dam, the Brangus had a higher percentage raised, which was followed by Brahman, Hereford and Angus. Where the pure breeds are concerned, the British breeds - Hereford and Angus - have slightly excelled the Zebu, Brahman and Brangus in both percentage calves born and percentage raised. A slight heterosis is indicated in calving percentage in some of the crosses. Using the crossbred female as the dam has been studied in a back-cross program for three years, thus giving a comparison of back-cross calves with purebred calves. In general, the crossbred females mated to a particular sire have averaged a higher percentage calf crop raised to weaning than the purebreds when mated to the same sire. The back-cross calves within a sire group have, on the average, exceeded the purebred calves in daily gain up to weaning. Little difference has been found in slaughter or feeder grade among breeds or crosses. More specifically, the calves containing three-quarter Brangus or three-quarter Charolais breeding had, on the average, the greatest daily gain, while three-quarter Angus and three-quarter Shorthorn calves were the lowest. Cows containing half Brahman breeding produced calves that gained best until weaning. In post-weaning feedlot gain, it appears that there is little or no advantage of the back-cross over the purebred. Daily gain on 140 day feed test has been similar for the three-quarter Angus, three-quarter Brangus, three-quarter Charolais, three-quarter Hereford and three-quarter Shorthorn. The three-quarter Brahman calves did not gain as well in the feedlot, on the average, as the other calves. The three-quarter Angus and three-quarter Shorthorn calves, on the average, graded the best in the carcass, while the three-quarter Brangus and three-quarter Hereford calves graded about one-third of a grade lower. The three-quarter Brahman and three-quarter Charolais calves graded approximately two-thirds of a grade lower, on the average, than the calves containing three-quarter Angus or Shorthorn breeding.

Texas: Hatch 650

Early carcass work showed rather conclusively that the differences in visual evaluation of live animal conformation between the British breeds and the Brahman types were, to an extent, either hallucinations, unimportant, or changed when the cattle were slaughtered and hung in the cooler. Improvement of the Brahman crossbred carcasses by infusion of British breeding was discontinued. However, the gainability of the Brahman as a breed proved to

be low and the initial crossing plan was maintained with the changed objective of increasing gainability.

Virginia: Hatch 93091

Preliminary results indicate that crossbred matings among Hereford, Angus and Shorthorn beef cattle produce fourteen percent more calves weaned per cow bred than straightbred matings. Considering the carcass weight and grade, the crossbred carcasses have averaged twenty to thirty pounds heavier than the straightbred carcasses with no differences in USDA carcass grade.

Louisiana (Jeanerette): AHRD L. P. d1-6

Data summarized on growth rate from birth to weaning and slaughter score at weaning disclosed that the Brahman-Angus grew the most rapidly. Africander-Angus and Brahman groups achieved the same daily gain, but were lower than the Brahman-Angus. Purebred Angus calves had the lowest daily gain. Data collected through 1958, 1959 and 1960 on a 75 day breeding season indicated that the Africander-Angus and the Angus cows had the highest conception rate of 84 percent, Brahman-Angus 76 percent, Brahman cows 72 percent, and Sindhi cows 64 percent. An evaluation of calf losses indicate that fifteen percent of the calves born died during the first 72 hours. The greatest mortality was due to still-births. The next greatest loss was due to drowning. Many calves die from exposure to rain and cold or to an extreme change in temperature. It is not uncommon to have a 20° drop in temperature in a short period of time. It has been observed that mortality of calves during the first three days after birth is high for Brahman-Sindhi and Brahman-Angus. Calves from Angus and Africander-Angus dams appear to be stronger at this time than calves of the other breed groups. The percent calves raised to weaning per cow bred was similar for Angus and Africander-Angus, being 68 and 67 percent, respectively. Weaning percent for Brahman-Angus was 59 percent and for the Brahman cows it was 51 percent. Brahman-Angus and Sindhi-cross steers gained more rapidly on feed test than the other breed groups. Angus steers received the highest slaughter score in carcass grade. Sindhi-cross steers were second in both slaughter and carcass grades. Africander-Angus and Brahman-Angus steers ranked third and fourth, respectively, in the two traits which were similar. Chilled dressing percent was similar for all breed groups. Ribeye area measurements indicate that Brahman-Angus and Sindhi-cross steers attained the largest measurements. This may be due to the larger carcasses of these two groups. Angus and Brahman steers received the smallest measurements in ribeye area, with the Brahman being smallest. There was great variation in shearing strength within breeds and between years. Angus steers yielded meat that was most tender, according to the Warner-Bratzler shear test.

Objective 4: To explore usefulness of systems of breeding, as (1) inbreeding, (2) crossbreeding, (3) outbreeding, and (4) combinations of these to accomplish objectives 1, 2 and 3.

Alabama: Hatch 525

Crossbreds have, in general, out-performed purebreds. It appears that steer calves with Shorthorn breeding, either from the sire or dam, and

regardless of the second breed, out-perform the other crossbreds as well as the purebreds.

Florida: State 390

Results for this objective have been reported under S-10 Objective 3.

Florida: State 629

Objectives accomplished by this project under this objective are reported under S-10 Objective 3.

Louisiana: Hatch 605

In general, the results of this study have shown that under sub-tropical environmental conditions there is a gain of production characteristics up to weaning time when crossing cattle of Zebu origin (Brahman and Brangus) with European breeds (Hereford, Angus, Shorthorn and Charolais). The gain due to hybrid vigor, heterosis, exhibited in the above crosses is not evident to the same degree when crossing the European breeds. However, when feedlot performance and carcass characteristics are considered, the crosses among the European breeds slightly excelled the species crosses. Using the crossbred female in a back-cross program has indicated that they have averaged a higher percentage calf crop raised to weaning than the purebreds when mated to the same breed of sire. Backcross calves within a sire group have, on the average, exceeded the purebred calves in daily gain up to weaning. Little difference has been found in slaughter or feeder grade among breeds or crosses. It appears that there is little or no advantage of the back-cross over the purebred in postweaning feedlot gain.

Virginia: State S-0131-S

In general, this project has shown most effects of inbreeding to be undesirable. The question of "how much" is yet unanswered.

Virginia: Hatch 93901

Preliminary results indicate that crossbred matings have produced fourteen percent more calves weaned per cow bred than straightbred matings, when using Angus, Hereford and Shorthorn in reciproaal crosses. Considering the carcass weight and grade, the crossbred carcasses have averaged twenty to thirty pounds heavier than the straightbred carcasses with no differences in USDA grade.

Louisiana (Jeanerette): AHRD L. P. d1-6

Inbred lines of Brahman-Angus and Africander-Angus cattle, based on a crossbred foundation, have shown some superiority of these types of cattle in some characteristics over Brahman, Sindhi and Angus. An evaluation of growth from birth to weaning indicated that the Brahman-Angus had the most satisfactory daily gain. Little difference in slaughter grade among Brahman-Angus, Africander-Angus, Brahman-Sindhi and Angus calves was noted at weaning time. Conception rate was low for all breed groups studied. Africander-Angus and Angus females attained the highest conception rate of 84 percent, evaluated by palaption; Brahman-Angus females 76 percent, Brahman cows 72 percent, and Sindhi cows 64 percent.

Objective 5: To study productiveness of existing or introduced stocks.

This objective is being studied in all of the contributing projects. Results which may be applicable under this objective are reported among the other S-10 objectives. Breeds that have been evaluated include Angus, Hereford, Shorthorn, Brahman, Brangus, Santa Gertrudis, and Charolais. Other breeds that have been studied as beef producers to a lesser extent include Holstein, Jersey, Devon, Romosinuano, and Romo-Carolina.

A LOOK AT THE S-10 PROJECT

R. E. Patterson

Dean Patterson, Administrative Advisor of S-10, reviewed the beginning of the S-10 project, including the acts enabling the formation of regional projects. He expressed pleasure in the great progress which has been made, even though generation intervals in beef cattle are long. The following is a summarization of Dr. Patterson's remarks.

In addition to its technological accomplishments, S-10 has been instrumental in catalyzing a basic change in philosophy among cattle producers as well as research workers. Results obtained from S-10 breeding projects have substantiated some generally held beliefs and have repudiated others. Specifically, there have been the following accomplishments:

1. Much has been learned about the heritability of major economic characteristics of beef cattle - gain rates, weaning weights, tenderness, and so forth.

2. Attention has been called to the need for designing breeding systems which produce the quality of meat which is demanded by consumers.

3. Additional insights have been achieved about the factors related to beef quality - particularly the conformation features which are and are not related to quality, and the relationship of fat to tenderness.

However, the great influence which S-10 has had on the commercial production and marketing of beef has not received enough general recognition. Specifically, the work related to beef quality has had considerable influence on recent proposals for revised grading. Also, S-10 has had some influence in the development of the PRI program.

The S-10 group should be congratulated on the progress which has been made in beef cattle breeding; especially in the development of new analytical techniques. Great opportunities exist for further development of the use of electronic equipment and nuclear science in cattle breeding work in the near future.

It must be stressed that a particularly important accomplishment of S-10 has been its encouragement of research people - the meats man, the physiologist, the geneticist, the economist, and others - to work together as a team, rather than going off in separate directions as individuals.

Some comments are necessary on some of the recent discussions among the southern experiment station directors about regional research and, specifically, the S-10 project. The project should be broad enough to allow necessary flexibility; however, the objectives should be well defined

and the project specific enough so that the objectives are obtainable. Prospects for expanded financial support from the USDA are not bright for the near future. However, there may be greater opportunities for grants from such organizations as the National Science Foundation and the Department of Health, Education, and Welfare. While the directors believe in regional research and will continue to support it, they are somewhat concerned about the need to restrict the amount of travel done in connection with these projects by administrative advisors and participating scientists.

It may be well to point out that research scientists in S-10 may need to be careful to avoid spending too much time in extension activities. We may need to do a better job of involving state extension specialists in the contributing projects, so that they can be more closely aware of the work which is being done and take a greater interest in disseminating the research findings.

CONTRIBUTIONS AND POSSIBILITIES OF THE S-10 REGIONAL PROJECT AS A PART OF BEEF CATTLE BREEDING RESEARCH[1]

E. J. Warwick

It is well to periodically re-examine regional projects by both looking back and attempting to peer into the future as we are doing here today.

I would like to do this by considering the objectives of the S-10 project one by one, giving my opinion of what has been accomplished under each, whether they are still legitimate objectives, and what other objectives and trends should be in our thinking for the future.

Objective 1. To develop breeding methods, selection criteria, and procedures which will result in beef cattle of higher productive efficiency and superior market quality of product.

This is an extememly broad objective and could be interpreted to cover everything which has been done, not only in S-10, but in all other regional projects as well. I will discuss under it only those things not more specifically covered under the other four objectives.

Much has been accomplished in developing selection criteria and procedures which we believe "will result in developing cattle capable of higher productive efficiency and superior market qualities of produce". Studies on methods of evaluating important traits, on environmental influences for which adjustments are needed, and on their heritability, have been major efforts of the project to date. The resultant voluminous literature is evidence of real contributions.

Efforts have been made to find physiological indicators of growth potential which can be used to predict future performance. These studies have not been very successful and have turned in the direction of learning more about basic physiology of growth.

The industry we serve has gone far in accepting our interpretation of the potential value of the application of techniques developed, as evidenced by about 308,000 cows in performance testing programs last year in many states, of which more than 20 now have breeder organizations sponsoring these programs in cooperation with extension. Several states in S-10 pioneered these efforts. Programs developed in other areas have, to a great extent, been based on Southern models. A national, perhaps international is a better term, beef cattle performance testing or registry association had its genesis in an S-10 state and has survived now for more than seven years.

During the past few years, several of the smaller beef cattle breed associations and, within the past two years, two of the major ones, have developed performance testing and carcass evaluation programs of various kinds as an outgrowth of research in this and other regions.

Research people do not develop these industry programs. Often we all feel these programs fall far short of what could be done and that some of

the programs used are actually unsound. However, they would not have developed without research. Most things of this kind must develop partly by evolution and we can look forward to changes and improvements as time goes on. We have an obligation to work with industry people in effecting needed improvements.

A few minutes ago I said we believed that techniques developed would result in more productive cattle. I think we should know. Statistical studies, heritability estimates, etc., are fine as guides, but in the final analysis we must have results from selection experiments before we can be sure of what results of selection are going to be. Observations suggest progress in line with expectation for at least some traits in some herds. Other things are disquieting, such as the fact that the heifers of average weaning weight in one herd have, over a period of years, produced heavier calves than those heifers that were, themselves, the heaviest. The necessary experiments require designs or procedures which will permit critical analysis of amount of progress. A few S-10 projects are reasonably good in this regard, but too many are not. Looking to the future, fewer projects are likely to be devoted to selection for improvement but these will, of necessity, be better controlled. Presently, I would view this area as one of the major shortcomings of S-10.

Objective 2: To develop beef cattle with higher reproductive efficiency, greater longevity, and other aspects of lifetime production efficiency.

This is one of the most, if not the most, important problem in beef production. Is it a forgotten problem in S-10? I do not know of a single S-10 publication on heritability of either character. Probably they are not highly heritable, but they may be heterotic. Summaries of reproductive rates have been made and indicate that reproduction is a real problem, some breed comparisons have been made, a limited amount of physiological research has been done, and some observations have been made in relation to inbreeding and crossbreeding which will be discussed later. Some projects are putting a lot of selection pressure on reproductive rates without any real knowledge of whether or not it is likely to be effective.

Thorough study and summarization of data now available in S-10 should be extremely helpful in further delineating the problem, and I am glad that studies are underway.

Solution of the reproduction problem in the South will depend upon fundamental physiological, genetic, and nutrition research. This must be done either within S-10 or in companion projects.

Objective 3: To develop cattle especially adapted to conditions in various environments of the region.

As originally written, this envisaged the development of new strains or breeds of cattle possibly on crossbred foundations. One state station undertook a program of this kind and one Federal station had such a program underway for several years prior to the initiation of the S-10 project. The objectives of the state project have since been changed and all crossbred type cattle have been disposed of. The program will likely be changed within the next year or two at the Federal station.

There has, however, been a developing interest in maintaining closed or nearly closed herds of existing breeds at specific locations with the view of determining whether their productivity can be increased. If successful in improving productivity, it will have to be determined if the strains or lines involved are generally productive under many environments or whether specific adaptability is involved.

A study was started last year involving a station in this region and one in another with a contrasting climate in an effort to determine whether differences will develop in the Hereford breed as a result of selection at the two locations.

Thus, interest remains in this question, but has been considerably redirected as compared to my interpretation of the original idea.

Objective 4. To explore the usefulness of systems of breeding, as: (1) inbreeding, (2) crossbreeding, (3) outbreeding, and (4) combinations of these to accomplish objectives 1, 2, and 3.

A great deal of progress has been made in S-10 on our understanding of what can be expected from crossbreeding among a variety of breeds. The rosently published Regional Bulletin represents a comprehensive summary of this work. Marked heterosis (11% over average of parental types and 7% over best parent) in growth rate to about 15 months of age was shown for Brahman-British crosses. The same crosses showed heterosis for maternal qualities of cows as evaluated by calf weaning weights. British x British crosses showed about 4% heterosis in growth rate. Carcass traits not directly related to growth rate showed little evidence of heterosis.

Unfortunately, this summary does not include information on fertility nor calf death losses. Small bits of information suggest that heterosis in these traits may be more important than for growth. In any event, available data should be summarized and additional information obtained. Little information is yet available on maternal qualities of British x British crosses.

Relatively few inbred lines have been formed in S-10, and since their development and testing is a long process, little information is yet available. Observation suggests lowered fertility and increased calf losses in inbred lines - - - thus indicating trends similar to those observed in other regions and with other species.

Objective 5. To study productiveness of existing or introduced stocks of beef cattle.

As a result of the S-10 work the qualities of the American Brahman as compared to the three British breeds of beef cattle have been fairly well delineated - - - showing that the Brahman has high heat tolerance, is a good mother, shows marked heterosis for growth and maternal qualities in crosses with British types but is late in sexual maturity, has a generally low reproductive rate, has a slow growth potential as a purebred, and lacks tenderness of lean.

To a more limited extent, characteristics of the Charolais have been determined showing good growth, high lean content, and apparent tenderness of lean in crosses with British breeds.

Semen from one South American breed, the Romo Sinuano, was imported and some information obtained on its possible usefulness in the region. Unfortunately, disease control problems prevented the continuation of this study or the initiation of other studies with exotic breeds. The Red Sindhi breed has been evaluated in a limited way for beef production.

Originally, one of the thoughts behind this objective was that there would be fairly extensive sampling of herds and/or sire progenies within the more popular breeds to determine if there were outstanding blood lines. Some of this has been done, but not on the scale nor on the systematic basis originally thought of. Directly and indirectly, enough has been done to indicate that there are no "super" strains of cattle, even though hereditary differences do exist.

I may be wrong in this, but it is my impression that the framers of the project had little intention of putting much, if any, emphasis on inheritance of defects of a qualitative nature. We have been forced into considerable work of this kind, and I believe Objective 1 can be stretched to cover it.

Thus far, I have been on fairly safe ground. You may disagree with details of my necessarily brief review, and might have put a different relative degree of stress on various things or included things I have overlooked. Basically, however, I am sure we would be in general agreement.

Looking to the future, I am sure you would all agree with my generalization that possibilities are unlimited for S-10! Some of these possibilities are:

1. Develop improved selection criteria and procedures.

This must continue and doubtless will never end, regardless of the length of time S-10 may endure as a regional project. Dairy Herd Improvement Association procedures are still changing after more than 50 years. From a research standpoint, we can be most productive in this area if we work on broad principles and do not worry too much about details which can never be completely accurate. We must continually look for new principles which can be used and adopted by the industry. It appears to me that in this regard two things are likely to receive the most emphasis:

a. Carcass traits - especially studies relating live animal characteristics to carcasses; and

b. Efficiency of feed utilization.

2. Determination of genetic parameters.

Knowledge of beef cattle breeding has progressed to the point where we now have a fairly good idea of the heritability of many traits

of importance, although we still need to fill in gaps in this regard. Of more importance, is the continuing need for information on genetic correlations and genetic-environemntal interactions. Increasing emphasis will be placed on these in the future.

3. Evaluation of breeding systems.

Basically, this is the "frosting on the cake", so to speak, and will make use of information developed on genetic parameters.

Theoretical considerations and pilot work with other organisms are necessary and valuable. It would seem desirable that those of us involved in beef cattle breeding research, ourselves, do more pilot work with laboratory animal species, setting up experiments applying specifically to beef cattle situations, and with beef cattle objectives in mind, particularly relating to carcass traits. To my knowledge, there is almost a complete absence of laboratory animal work having a bearing on carcass characteristics.

In the final analysis, however, me must explore with cattle, themselves, those things which theory and pilot trials show have promise. This will require tight, well-controlled experiments. It may well be that other research will have to be curtailed in order to make room for properly designed experiments to get critical comparisons of what can be expected from various breeding systems.

4. Basic genetic and physiological information on reproduction, growth, and development.

This is obviously a very broad topic. Increases in knowledge of the biochemistry and endocrinology of the bovine will come partially from work of those in related fields, working on broad fronts; and partially from specific work with cattle. S-10 can never cover this broad front, but should, in my opinion, be making contributions toward specific segments, especially as they relate directly to cattle.

We will probably have to take somewhat of a middle ground in regard to our own participation in work of this kind, since we cannot put all our effort in a breeding project into fundamental work which may - or may not - ultimately effect practical procedures. I believe it was Dr. Lush who is reputed to have said many years ago that "we are going to have to continue to breed bulls to cows and not pituitaries to thyroids." This is true. The possibilities exist, however, of knowing a lot more about specific bulls and about specific cows and mating them in combinations to make the most productive offspring.

To summarize, I would offer the following points for consideration:

1. The objectives of the S-10 project were originally sound and all items covered are still of importance.

2. We have not accomplished all the objectives called for. This was not expected in a period of 14 years.

3. A restatement and redefinition of objectives in more specific terms may be desirable.

4. The future will call for more tightly designed experiments looking to the solution of particular problems.

CHALLENGES FOR THE FUTURE IN BREEDING RESEARCH[1]

J. E. Legates
North Carolina State College

More stress is placed upon looking into the future today than perhaps at any previous time. With today's rapid pace, this is most important since the future becomes the past almost without a pause for the present. A part of this dilemma arises from the increasing rapidity of change, even in a notoriously slow-moving discipline such as breeding. But at least a part of this so-called illusion arises from the restricted vision permitted by our limited imaginations. It is important that we responsibly stretch our imaginations to gain as clear a vision of prospective trends as possible. Thus, while I confess no special qualifications to discuss the assigned topic, I appreciate your indulgence in assigning it to me; for it has disciplined me to think more seriously about those things which all of us in this field have a personal responsibility to consider.

Defining accurately economic worth is a challenge we must accept with increased responsibility. Insensitivity to the consumers' requirements will be tolerated less and less as competition from substitutes for animal products becomes keener and keener. Many of the factors accounting for the poor transmission of information from the consumer to the producer are not fully under our control. Our consumers are far from 100% sure of what they want. Furthermore, though we hear much about quality, we find that buying policies are slow to give a realistic premium to the producer for what the consumer is supposed to want - (protein vs. fat) in beef, pork, and even in milk. Rumblings of change are being expressed more frequently and there is evidence of some action. Perhaps the specifications of the "meat type steer" may be available before we realize it.

Our commercial producers first will feel this impact when the markets begin to reflect with more sensitivity consumer requirements. However, there is often a lag in communications to breeding establishments when actually they should be the first to receive the message. Breeding establishments must maintain superior genetic merit for qualities which are important to the commercial producers if they are to retain their esteemed positions as producers of seed stock. Throughout, we in education and research have an increasing responsibility to interpret the facts with all the clairvoyance we can muster. Prejudicial thinking by any segment of our livestock industry will retard progress and weaken our competitive position.

As we review the past, we recognize that significant contributions to quantitative genetic theory have not appeared frequently. The rediscovery of Mendelism gave us a start, but it then took several years to reconcile the inheritance of quantitative traits with these facts. Following reasonably closely were the continuing contributions of Fisher and Wright, providing a working statistical framework within which we have been able to predict logically expected changes and to interpret patterns of genetic response. Many extensions of our theory of quantitative inheritance have been made,

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[1]Prepared for the S-10 Technical Committee meeting, June 25-27, 1962.

and in practically all instances the mathematical theory has outstripped even experimental verification or utilization. In a limited sense this is as it should be, for several mathematical approaches can be fully justified preparatory to the experimental test. However, in the end we must recognize that breeding is more than the manipulation of symbols, and biological verification is necessary to test and sharpen our mathematical models.

We are currently involved in asking ourselves the initial question. Is selection as effective as it should be? This is a worthy question, since the reasons for the failure of populations to respond to selection not only helps explain the errors of estimate for the simple prediction equation that genetic gain is the product of heritability and selection differential, but it should give clues as to the genetic characterization of the populations that are plateaued. Several possible explanations have been offered to account for the fact that selection response is not as effective as it should be:

1. Inbreeding decline (finite population size);

2. Negative-genetic relations among components of performance;

3. Genotype-environmental interactions intra and extra environmental;

4. Accumulation of mutations that are prevailingly deterimental; and

5. Loss of favorable inter allelic combinations.

We shall need to examine these with much interest. It is clearly evident that a characterization of the relative magnitude of additive, dominance, and epistatic variances is just a beginning step in accurately predicting response to selection.

In animal breeding, I feel there is a tremendous challenge before us to come forth with large animal populations that have plateaued to selection. On the basis of laboratory findings we have some hope of reaching the improbable position of a selection plateau. Upon arriving there, I hope no one will feel the effort has been futile, for we need to examine real circumstances. We continue to point to the possible ineffectiveness of selection and look on a selection plateau as if it were to be avoided as a plague. I think it would be a real mark of accomplishment and a monument to progress if we could climb upon several such plateaus. Firstly, it would bear evidence to the fact that selection had really been practiced, provided we maintain an effective population size of reasonable magnitude and with proper controls were able to verify that progress had been made. Secondly, we would have populations to work with to see just what could be done to move them from their adaptive peaks. Rather than a speculative situation, we could now have the real thrill of a first-hand encounter with a plateaued population. In poultry at California in connection with shank length, in selection work for size in mice, and in a number of Drosophila populations, selection plateaus have apparently been reached. How long will we have to wait to observe the same phenomenon in our large animals?

Perhaps more often that we can recount we have been given the notion that selection is to be directed toward the fixation of the genes influencing the desired traits. We are now beginning to realize naivete of such a model. As selection becomes over-efficient from the population standpoint, it may lose its plasticity and capacity to reproduce. With homozygosity it would become genetically inflexible and be unable to respond to environmental changes. All reports to date indicate that there is a delicate interrelationship, which the naturalist has termed co-adaptation, at the plateaus. The individual's striving for existence commands its greatest effort; the population expresses the same urge.

If our selection moves at a slow pace, internal adjustments may take place as we move along. But if we become impatient and find ourselves on a plateau, what can we do.

1. Relax selection and permit time for co-adaptation before moving to the next peak. Such was apparently the case with Mather and Harrison's Drosophila.

2. Perhaps a more attractive solution to us would be to cross two or more populations plateaued at a high level of merit or desirability. These populations would be in varying stages of co-adaptation, and out of their pool a combination that would permit new heights of desirability could be chosen. This would be the situation encountered by Falconer in crossing the Goodale and McArthur strains of mice.

3. Perhaps we could speed up the process of co-adaptation under relaxed selection by using low-intensity ultra-violet or X-rays. There is some suggestion in Drosophila populations that low energy sources may stimulate crossing over and provide new recombinants. We are most ignorant of the cytogenics of our large animals, and intensive effort here seems warranted.

We in animal breeding may feel that we are quite removed from the developments in molecular biology. These developments are going to be moving with increasing rapidity, and they may have more to contribute to our work than we can imagine. Our mathematical models can be no more explicit than their biological foundations. The nature of gene action, the uncertainties regarding dominance and over-dominance will never be fundamentally explained by a mathematical approach. These are physio-chemical phenomenon which mathematical formula can describe but not explain. Surely the resolution of the roles of DNA and RNA with the potential for explaining gene action even more fully, should provide a basis for formulating more adequate models for our operational approaches to breeding. I hasten to add that, even though our information about each locus might become more complete, a logical mathematical approach will continue to be most important. With the large number of loci that are now suggested for our quantitative traits, certainly only a few of the loci that have major effects on a trait would be expected to still be segregating.

It has been proposed that a characterization of the output of the several endocrine systems affords the real key to direct the ultimate in

improvement. An assay of those hormone and enzyme systems which influence the expression of a trait should be a more effective base for selection to improve the trait. I am in full sympathy with a many-sided attack on these problems, but I am skeptical of easy solutions to our genetic problems. Now, as for enzymes or hormones that are concerned with growth for example, presume we can assay for the growth promoting fraction from the pituitary. Can we not expect that the activity of the pituitary will vary according to the age, general health, environmental stress, and stage of development of the individuals? Environmental, as well as inherent, factors surely will influence the level of pituitary activity. Just when, at what age, and under what environmental conditions can meaningful assay results be expected?

Then, with a process as complicated as growth, surely the interactions of an innumberable complex of other hormones and enzymes, as well as energy sources, must be anticipated. If the number of enzymes involved in a process approach the number of loci influencing a trait, one can see the improbability of being able to put the individual genes in their proper perspective by the individual gene approach. Presently we are hardly able to put the individual traits which result from the action of many systems in their proper and proportionate perspective, even with the assistance of our mathematical logic. It will continue to be needed in the future, but logic of itself can lead to wrong conclusions unless it is firmly based and properly directed. New biological facts must be used to direct our operational approaches.

Our attempts to change economically important traits must be developed within the framework that governs changes in fitness of natural populations. In contrast to natural populations, in an economic setting we are often able to ameliorate the environmental stresses to relax the tension imposed on the population by the need to maintain fitness. Insofar as possible, our husbandry is directed toward preventing fitness from containing or dissipating unduly our selection efforts. Then we seek to direct change in those traits which contribute most to the economic fitness of the population, within the limits of the environmental regimes that economic returns will permit us to maintain. If the returns are great, more artificiality in conditions will be tolerated as we seek to pervent fitness from becoming a limiting factor in our breeding approach.

In certain breeding approaches, reproductive fitness rapidly becomes a limiting factor to its continuation. This is peculiarly true of inbreeding in cattle. But as we recognized earlier, if the potential for genetic gain and economic returns are high enough, we usually can find ways of circumventing these limitations. The use of embryo transfers in cattle may be a real help in overcoming the fertility barrier so that an effective line crossing program might be possible. We further recognize the potential ova transfer has for extending the usefulness of outstanding females, but without inbreeding the most we can hope for is to develop large families of full sibs. Probably, the stakes would not be so high here as in the application of these techniques with inbred lines.

The secret of identical twinning may also eventually be revealed to us. With embryo cultures, perhaps, we can then produce an unlimited number of offspring from a most favorable F_1 combination. Then we might find ourselves

in the position of the corn breeders trying to locate even more superior crosses. Even with F_1's, we would have to maintain the embryo cultures through a testing period to see which combinations merited being continued for the production line technique.

There is a very real challenge before us to make artificial insemination a valuable tool for genetic improvement. It is gaining acceptance in beef cattle. When its advantages are fully available and recognized, more and more persons will be willing to justify managemental innovations to circumvent the apparent inconviences that now exist. If it has something tangible to contribute, and I am convinced that it does, acceptance will be forthcoming. This will not only extend the usefulness of outstanding sires, but it will permit ever so much more accurate appraisal of their breeding values than has been possible under the most idealized conditions of natural service. Again, where the potential for use and returns are high, a much more substantial investment can be justified in carrying forward a comprehensive progeny testing program.

As testing programs supervised by impartial parties move ahead, more progressive breeders will be willing to cooperate with experiment stations to try new procedures with a calculated risk and to assist in gaining parameter estimates. This phase of cooperation will be particularly important in the future since the herds directly under experiment station control cannot hope to provide answers for all the growing needs of the industry. We have been engaged during the past 15 years with the estimation of genetic parameters and meaningful evidence is now beginning to accrue. However, we recognize our shortcomings in gaining sufficient information on carcass merit, the many aspects of genotype-environemntal interactions, and genetic differences among herds. We must continually examine the role of our experimental herds in providing needed information and recognize their limitations. In my judgment, they must be deployed in answering those queries which cannot be answered from cooperator herds. There will be less and less justification for maintaining herds in the fashion of our breeders or commerical producers. We shall be challenged to depart from orthodoxy. This is a more difficult challenge than most recognize it to be, for many of us have come from unusually conservative backgrounds where practicability came first. This cannot be the case in all our research. Rather, in some situations the attitude should be first. Can we do it? The practicability of the finding will unfold in due course.

Instrumentation will play an increasing role in breeding research of the future. We are noting just a part of this increase with ultrasonics, photogrammetry, and so forth. Furthermore, manufacturers are most interested in developing other instruments to meet our needs. Along the same line, computing facilities have expanded greatly and will continue to improve. These, as well as many other unforseen developments, will be available to assist us to tackle problems we formerly could not have given consideration. But there is often a temptation to substitute the massive approach in lieu of the critical. A recent article in Science on scope verses thought in research made several pertinent points in this connection. Our problems are going to be more

complex and difficult in the future, but massive busy work cannot serve as a meaningful substitute for inquisitive, imaginative, and interpretative thought coupled with individual industry and ingenuity. We are also going to need keener minds to get the job done.

The future is going to be particularly challenging and demanding. The problems will be extremely knotty, and we will need the assistance of persons in many disciplines to help us accept them as challenges. All of us must have a vision of what is ahead - always trying to outguess the future - then adjusting and correcting focus on what is needed as situations change. We will have to fashion our product for changing consumer demands, and our animals will continually need remolding such as the potter in Jeremiah handled his clay: "And the vessel that he made of clay was marred in the hand of the potter; so he made it again another vessel as seemed good to the potter to make it."

TABLE 1. Cattle Inventory and Percent Used
in S-10 Contributing Projects
July 1, 1962

State	Cows Two Years and Over	Yearling Heifers	Bulls and Steers Under 1 yr.	Heifers Under 1 yr.	Bulls Over 1 yr.	Steers Over 1 yr.	Total Number	Percent used in Project
Alabama	375	72	146	133	25	35	786	100
Arkansas	336	90	132	110	53	0	721	100
Florida	41	9	15	14	3	0	82	100
Georgia	673	187	255	251	41	108	1515	98
Kentucky	17	87	5	5	3	0	117	100
Louisiana	345	104	141	110	18	0	718	100
Mississippi	600	120	237	257	23	42	1279	87
N. Carolina	265	56	95	82	6	39	543	89
S. Carolina	204	52	63	70	19	0	408	50
Tennessee	1354	296	412	438	176	188	2864	100
Texas	399	78	119	156	57	0	809	100
Virginia	131	0	0	0	5	47	183	100
W. Virginia	77	20	24	14	11	25	171	100
Federal-State Cooperative Stations:								
Brooksville, Florida	335	73	73	88	46	0	615	100
Jeanerette, Louisiana	305	44	130	103	46	0	628	100
Front Royal, Virginia	458	77	145	141	44	0	865	100
Totals:	5915	1365	1992	1972	576	484	12,304	

TABLE 2. Number of Animals on Feeding and Grazing Tests
in S-10 Contributing Projects
1961 - 1962

State	Bulls		Heifers		Steers		Totals			Total all Sexes	Percent Bulls Fed Coop.
	Sta.	Coop.	Sta.	Coop.	Sta.	Coop.	Bulls	Heifers	Steers		
Alabama	25	40	50	5	0	0	65	55	0	120	61
Arkansas	24	23	107	0	0	0	97	107	0	204	23
Florida	0	0	0	0	0	0	0	0	0	0	0
Georgia	63	100	65	0	60	48	163	65	108	336	61
Kentucky	0	0	92	6	12	10	0	98	22	120	0
Louisiana	0	0	0	0	96	0	0	0	96	96	0
Mississippi	2	81	0	0	0	0	83	0	0	83	97
N. Carolina	22	0	28	28	39	0	22	56	39	117	0
S. Carolina	18	0	18	0	41	0	18	18	41	77	0
Tennessee	62	0	296	0	112	0	62	296	112	470	0
Texas	28	7	162	6	58	1	35	168	59	262	20
Virginia	0	0	0	0	47	0	0	0	47	47	0
W. Virginia	0	0	0	0	0	0	0	0	0	0	0
Federal-State Cooperative Stations:											
Brooksville, Florida	70	0	138	0	0	0	70	138	0	208	0
Jeanerette, Louisiana	20	0	16	0	63	0	20	16	63	99	0
Front Royal, Virginia	44	0	78	0	23	0	44	78	23	145	0
Totals:	428	251	1050	45	551	59	679	1095	610	2384	58.6

TABLE 3. Regional Research and Animal Husbandry Research Division Funds Allocated to Contributing S-10 Projects Fiscal Year 1962 and 1963

	Regional Research Funds*		AHRD Funds**	
	1962	1963	1962	1963
Alabama	19,830	19,830	2,400	2,400
Arkansas	11,000	11,000	3,000	3,000
Florida	8,700	8,700	2,500	2,500
Georgia	5,500	5,500	3,640	4,640
Kentucky	9,300	10,800	-	-
Louisiana	6,000	6,500	-	-
Mississippi	8,000	8,000	2,400	2,400
N. Carolina	9,350	11,000	1,800	1,800
S. Carolina	-	-	-	-
Tennessee	12,000	12,000	9,600	13,600
Texas	10,000	10,000	8,400	8,400
Virginia	9,500	9,500	6,100	6,100
West Virginia	-	-	-	-
Totals:	109,180	112,830	39,840	44,840

* Allocated by Directors of State Agricultural Experiment Stations.
** Allocated through S-10 Ragional Coordinator's office.

Auburn University
Agricultural Experiment Station

I. PROJECT: 525 (S-10)

The Improvement of the Beef Cattle of Alabama Through Breeding Methods

II. OBJECTIVES:

To determine the effectiveness of mass selection for total performance in beef cattle.

To develop criteria for evaluating and selecting breeding animals.

To study the influence of heterosis in crosses between the three British breeds of beef cattle.

III. PERSONNEL:

Troy B. Patterson, Project Leader, Associate Animal Breeder
George B. Meadows, Assistant Animal Husbandman
W. M. Warren, Head, Animal Science Department
R. S. Temple, Regional Coordinator, S-10

IV. ACCOMPLISHMENTS DURING THE YEAR:

1. Scope and nature of work:

Facilities include 950 acres, of which 600 are in improved pasture or hay meadows. Paddocks are available for group feeding up to 150 bulls, 150 heifers and 100 steers. In addition, lots are available for group feeding sire progeny groups of up to 40 calves. A new feed processing unit has been added so that processing of feed for these groups is no longer a problem.

A total of 223 brood cows, 44 replacement heifers and 16 herd bulls are currently in use on various phases of the project. Of the above females, 132 (56 Angus, 59 Hereford and 17 Shorthorn) are used on the purebred selection phase. The remaining 135 head - of which 37 are Angus, 29 are Herefords, 28 are Shorthorns and 41 are crossbreds - are used on the crossbreeding phase. The 16 bulls are composed of nine Angus, five Herefords and two Shorthorn.

In addition to the above, 120 grade cows of predominately Hereford breeding located at two substations are used in support of research at the main station.

2. Research Results:

Since it requires about five to six years to complete one generation in beef cattle, the purebred phase of this project is just now approaching its maximum potential for evaluating mass selection. The first four years of the project represented a build-up in foundation cows with little culling or selection being practiced. At present, a limited number of second and third generation females are included in the herd. In addition, one or more bulls have been retained for breeding from each of the three purebred lines. Recent purchases of bulls of all three breeds have added great potential to each herd. Indications are that at least the Angus herd will be closed to outside breeding, provided one or more of five young bulls - now being performance and progeny tested - turn out to be excellent herd sires. Closing of each herd is necessary if a maximum of reliable information is to be obtained.

Data collected from the herds to date will be used to calculate correction factors for age of dam. Sufficient data now has been collected so that corrections for sex of calf can be made. Correcting to steer equivalent, these factors are: for bulls -23 pounds; for heifers +47 pounds. These values may change gradually over the next few years, but sizable changes are not anticipated. In addition to the above, as more dam-daughter pairs by the same sire become available, heritability estimates for all economic traits will be calculated for possible use in various types of selection indexes.

Recent studies on milk production have been completed utilizing the cows from the purebred and crossbred lines. There were 48 Angus, 53 Hereford, 20 Shorthorn and 14 crossbred cows in this study. All cows were milked at 30, 60, 90, 180 and 250 days post-partum. Milk production data were calculated on a 12-hour basis. Total milk, fat corrected milk (FCM) and percent fat were found to be highly repeatable ($P<0.01$) between successive milkings. More important, however, is the significant relationship shown between milk production and calf gain. The relationship of milk production, milk components and calf weight with slaughter grade was also studied. It appears from these data that milk per se is more important than any of the component parts in affecting slaughter grade. Also, calf weight is related to slaughter grade.

Repeatability of suceessive records is the upper limit of heritability. A study of repeatability of successive records as measured between years is presented in Table 1.

TABLE 1. Repeatability of FCM From Year to Year

	Days of Lactation					
Breed	d.f.	90	d.f.	180	d.f.	250
Angus	17	0.235	24	0.773**	24	0.655**
Hereford	18	0.671**	26	0.496**	28	0.486**
Shorthorn	5	-0.007	9	0.510	8	0.536

** $P < 0.01$

Small numbers in the Shorthorn breed make the data for this breed meaningless. However, these values indicate that milk production in beef cattle is a highly heritable trait. Heritability estimates based on the parental half-sib correlation and the intra-sire class correlation method support these findings. These estimates are given in Table 2.

TABLE 2. Heritability Estimates for Milk Production

Breed	Method of Estimation	
	Paternal Halfsib	Intra-sire 1/ Class correlation
Angus	0.860	0.332
Hereford	0.794	0.459

1/ Each estimate obtained by this method was calculated from data with significant sire differences.

These estimates, plus the fact that milk production and calf gain are related, indicate that rapid progress in milk production improvement can be made by selecting heavier calves at weaning.

Three years' data have been completed for the first phase of the crossbreeding study. Results from 39 purebred and 39 crossbred steers indicated that the crossbreds weaned heavier (43 pounds), gained faster on pasture (32 pounds) and gained more in the feed-lot (19 pounds). The crossbred steers were fatter and, as a result, graded 0.27 of a grade higher. After correcting for differences in carcass weight, there was no significant difference between the rib-eye area of crossbreds and purebreds. The differences between purebreds and crossbreds was not as great for heifers (38 purebreds and 36 crossbreds) as was shown for steers. This difference was only 14 pounds in favor of the crossbreds at weaning while the purebreds gained faster in the feedlot (1.64 vs 1.59 pounds daily).

Two years of a study designed to test the effectiveness of selection based on performance testing have been completed. High and low gaining Hereford and Angus bulls have been retained from the performance test for use in this study. They were bred to comparable groups of cows which were selected on the basis of previous record and breed. Two years' results from two locations have been obtained, and are presented in Table 3.

TABLE 3. Progeny from Performance Tested Bulls
(Two Year Average)

Breeding Group	Location	No. of Calves	Breed	Adj. weaning weight	Post-weaning Gain
High Sire	1		Angus	570.0	2.38
High Offspring	1	30	Angus	520.1	1.93
Low Sire	1		Angus	517.5	1.78
Low Offspring	1	28	Angus	500.2	1.81
High Sire	1		Hereford	575.0	2.74
High Offspring	1	29	Hereford	538.5	1.88
Low Sire	1		Hereford	520.0	1.78
Low Offspring	1	30	Hereford	494.6	1.74
High Sire	2		Hereford	630.0	2.43
High Offspring	2	33	Hereford	529.3	--
Low Sire	2		Hereford	502.0	2.00
Low Offspring	2	32	Hereford	501.8	--

VI. PUBLICATIONS DURING THE YEAR:

Patterson, T. B., W. M. Warren, J. F. Price and G. B. Meadows. 1962. Crossbreeding with British Breeds. Highlights of Agricultural Research, Vol. 9, No. 1.

Caldwell, Jerry and T. B. Patterson. 1962. The Influence of Total Milk Production, Butterfat, Protein, Total Solids and Change in Cow Weight and their Interrelationships on Calf Weight and Slaughter Grades in Beef Cows. Paper presented: American Society of Animal Science, Southern Section, Jacksonville, Florida, February 6, 1962.

Caldwell, Jerry. 1962. Heritability and Repeatability of Milk Production in Beef Cows and the Relationship of this Trait with Calf Performance. Master's Thesis, Auburn University Library.

VII. PUBLICATIONS PLANNED:

The data from Mr. Caldwell's thesis is to be published in the Journal of Animal Science.

Submitted By: Troy B. Patterson

I. PROJECT: 525-1 (S-10)

A Comparison of Crossbreeding and Within Breed Selection on Beef Cattle Production in the Black Belt area of Alabama.

II. OBJECTIVES:

To evaluate the significance of hybrid vigor in various crosses of beef cattle with regard to production of slaughter calves, stocker or feeder steers and slaughter steers.

To determine the effect of heterosis on mothering ability, adaptability and fertility.

To determine the most economical method of finishing steer calves that are dropped in the spring from the above system.

III. PERSONNEL:

Troy B. Patterson, Project Leader
L. A. Smith, Superintendent, Black Belt Substation
Harold Grimes, Assistant Superintendent, Black Belt Substation

IV. ACCOMPLISHMENTS DURING THE YEAR:

1. Scope and nature of work:

Sixty brood cows, of which twenty are first-cross Brahman X Hereford and forty are high grade Hereford, have been devoted to the first phase of this test. Since these were mature cows initially, several have been removed under standard management procedures. Wherever possible cows of similar breeding have been used as replacements. Despite this effort, fewer numbers were available for the last two years of the test. Matings were made to produce approximately equal numbers of Hereford, Angus X Hereford and 3/4 Hereford-1/4 Brahman calves.

Randomly selected females from these breeding groups were retained for use in phase 2 of the study. These heifers are being bred as follows:

Bull	Cow	Offspring
Hereford	Hereford	Hereford
Hereford	1/2 A.-1/2 H.	3/4 H.-1/4 A.
Angus	1/2 A.-1/2 H.	3/4 A.-1/4 H.
Hereford	3/4 H.-1/4 B.	7/8 H.-1/8 B.

In addition to weaning information on all calves, post-weaning performance and carcass evaluations are being obtained on all steers.

2. Research results:

A five year summary of the completed results of phase 1 is given in Table 1.

TABLE 1. Five Year Average by Breeds of Calves
Crossbreeding - 1956-57, 1960-61
(Phase 1)

Breed of Calves	No. of Calves	Birth Weight	Adjusted* Weaned Wt.	Adjusted* ADG	Slaughter Score
Hereford	75	67.9	535.8	1.83	9.7
1/2 A.-1/2 H.	64	66.2	548.0	1.89	9.0
3/4 H.-1/4 B.	84	63.6	518.3	1.78	9.4

* Adjusted to mature dam, steer equivalent and 255 days.

These data have not been analyzed statistically, and, therefore, the differences will not be discussed.

Only two years, with limited numbers, have been accumulated on the second phase. These data are presented in Table 2.

TABLE 2. Two Year Average by Breeds of Calves
Crossbreeding - 1959-60, 1960-61
(Phase 2)

Breed of Calves	No. of Calves	Birth Weight	Adjusted* Weaned Wt.	Adjusted* ADG	Slaughter Score
Hereford	13	65.9	442.9	1.48	7.4
3/4 A.-1/4 H.	9	59.1	464.3	1.59	8.3
3/4 H.-1/4 A.	8	62.8	458.8	1.56	8.2
7/8 H.-1/8 B.	14	61.2	443.0	1.50	8.0

* Adjusted to mature dam, steer equivalent and 255 days.

Post-weaning performance for the 1960-61 steers are presented elsewhere in this report, and will not be repeated here. Again, the numbers were too small to have any significance.

V. FUTURE PLANS:

To continue with phase 2 for approximately eight more years, or until the youngest cow is about ten years old.

VI. PUBLICATIONS DURING THE YEAR:

None

VII. PUBLICATIONS PLANNED:

Station progress report covering the first phase.

Submitted by: Troy B. Patterson

52
Ala. (8)

Form I

COW PRODUCTION, 1961 CALF CROP

	Alabama					State
Location	Auburn	Auburn	Auburn	Auburn	Auburn	Auburn
Breed of sire	Angus	Hereford	Shorthorn	Angus	Angus	Hereford
Breed of dam	Angus	Hereford	Shorthorn	Hereford	Shorthorn	Angus
Line or group[1]	Angus	Hereford	Shorthorn	Crossbr.	Crossbr.	Crossbr.
No. cows exposed[2]	48	46	7	10	9	9
No. calves born[3]	32	30	3	7	6	7
Calving percent, born	66	70	43	70	67	78
Ave. birth date	11/6/60	11/23/60	11/28/60	11/28/60	12/19/60	11/13/60
Ave. birth wt.	60.5	68.7	63.2	64.0	66.0	58.5
Number calves weaned	30	30	3	4	5	7
Calving percent, weaned[4]	62	65	43	40	56	78
Ave. weaning age, days	250	250	250	250	250	250
Adj. A.D.G.[5]	2.01	1.84	1.78	1.60	1.61	1.90
Ave. type score[6]	11.7	11.6	12.4	10.0	10.0	12.5
Ave. condition score[6]	10.1	9.4	10.2	9.0	9.7	11.5

1 - Purebreds, grade, line, backcross, 3-breed crosses, treatment, etc.
2 - Total number put in breeding herd.
3 - Total number born, dead + alive.
4 - Number weaned divided by number of cows exposed.
5 - Indicate adjustments. Mature dam, all weaned at 250 days, adjusted to steer weights
6 - 15,16 and 17 = Fancy
12, 13 and 14 = Choice
9, 10 and 11 = Good
6, 7 and 8 = Medium

COW PRODUCTION, 1961 CALF CROP Alabama

State

Location	Auburn	Auburn	Auburn	Auburn	Auburn	Auburn
Breed of sire	Angus	Hereford	Shorthorn	Hereford	Shorthorn	Shorthorn
Breed of dam	Angus	Hereford	Shorthorn	Shorthorn	Angus	Hereford
Line or group[1]	Crossbr.	Crossbr.	Crossbr.	Crossbr.	Crossbr.	Crossbr.
No. cows exposed[2]	12	12	12	9	8	10
No. calves born[3]	11	8	9	7	8	7
Calving percent,	92	67	75	78	100	70
Ave. birth date	11/24/60	11/28/60	11/22/60	11/25/60	11/16/60	11/22/60
Ave. birth wt.	54.7	68.3	63.8	67.8	63.5	73.0
Number calves weaned	10	8	9	7	8	7
Calving percent, weaned[4]	83	67	75	78	100	70
Ave. weaning age, days	250	250	250	250	250	250
Adj. A.D.G.[5]	1.75	1.70	1.74	1.63	1.90	1.91
Ave. type score[6]	11.5	10.8	11.2	11.8	12.0	12.0
Ave. condition score[6]	10.1	10.7	9.2	11.0	11.8	11.7

1 - Purebreds, grade, line, backcross, 3-breed crosses, treatment, etc.
2 - Total number put in breeding herd.
3 - Total number born, dead + alive.
4 - Number weaned divided by number of cows exposed.
5 - Indicate adjustments. Mature dam, all weaned at 250 days, adjusted to steer weights
6 - 15, 16 and 17 = Fancy
12, 13 and 14 = Choice
9, 10 and 11 = Good
6, 7, and 8 = Medium

FORM I

54
Ala. (10)

COW PRODUCTION, 1961 CALF CROP

State: Alabama

Location	Auburn	Auburn	Auburn	BlackBelt	BlackBelt	BlackBelt
Breed of sire	Angus	Hereford	Shorthorn	Hereford	Angus	Hereford
Breed of dam	H x S	A x S	A x H	Hereford	Hereford	1/2B-1/2H
Line or group[1]	Crossbr.	Crossbr.	Crossbr.	Crossbr.	Crossbr.	Crossbr.
No. cows exposed[2]	9	8	5			
No. calves born[3]	8	7	5			
Calving percent, born	89	88	100			
Ave. birth date	10/25/60	10/26/60	10/28/60	12/28/60	11/28/60	10/10/60
Ave. birth wt.	66.6	69.0	59.3	68.9	62.0	68.7
Number calves weaned	8	7	5			
Calving percent, weaned[4]	89	88	100			
Ave. weaning age, days	250	250	250	255	255	255
Adj. A.D.G.[5]	1.94	2.09	1.90	1.86	1.99	1.84
Ave. type score[6]	10.6	11.3	9.3			
Ave. condition score[6]	8.8	10.0	8.3	9.1	10.2	9.2

1 - Purebreds, grade, line, backcross, 3-breed crosses, treatment, etc.
2 - Total number put in breeding herd.
3 - Total number born, dead + alive.
4 - Number weaned divided by number of cows exposed.
5 - Indicate adjustments.
6 - 15,16 and 17 = Fancy
12, 13 and 14 = Choice
9, 10 and 11 = Good
6, 7 and 8 = Medium

Auburn: Mature dam, all weaned 250 days, adjusted to steer weights
Black Belt: Mature dam, all weaned 255 days, steer equivalent

FORM I

COW PRODUCTION, _____ CALF CROP

_____ State

Location						
Breed of sire						
Breed of dam						
Line or group[1]						
No. cows exposed[2]						
No. calves born[3]						
Calving percent, born						
Ave. birth date						
Ave. birth wt.						
Number calves weaned						
Calving percent, weaned[4]						
Ave. weaning age, days						
Adj. A.D.G.[5]						
Ave. type score[6]						
Ave. condition score[6]						

1 - Purebreds, grade, line, backcross, 3-breed crosses, treatment, etc.
2 - Total number put in breeding herd.
3 - Total number born, dead + alive.
4 - Number weaned divided by number of cows exposed.
5 - Indicate adjustments.
6 - 15, 16 and 17 = Fancy
12, 13 and 14 = Choice
9, 10 and 11 = Good
6, 7 and 8 = Medium

FORM I

COW PRODUCTION, 1961 CALF CROP

State Alabama

Location	Upper Coastal Plain Substation					
Breed of sire	Angus	Hereford				
Breed of dam	Mixed	Mixed				
Line or group[1]	Low-gain	Low-gain				
No. cows exposed[2]						
No. calves born[3]						
Calving percent, born						
Ave. birth date	10/7/60	10/6/60				
Ave. birth wt.	53.0	60.0				
Number calves weaned						
Calving percent, weaned[4]						
Ave. weaning age, days	300	300				
Adj. A.D.G.[5]	1.46	1.38				
Ave. type score[6]						
Ave. condition score[6]	6.9	7.1				

1 - Purebreds, grade, line, backcross, 3-breed crosses, treatment, etc.
2 - Total number put in breeding herd.
3 - Total number born, dead + alive.
4 - Number weaned divided by number of cows exposed.
5 - Indicate adjustments. Mature dam, weaned at 300 days, steer equivalent
6 - 15,16 and 17 = Fancy
12, 13 and 14 = Choice
9, 10 and 11 = Good
6, 7 and 8 = Medium

TABLE II

POSTWEANING PERFORMANCE OF CALVES FED IN 1961

Alabama State

Location	Auburn	Auburn	Auburn	Auburn	Auburn	Auburn
Breed of sire	Angus	Hereford	Shorthorn	Angus	Hereford	Shorthorn
Breed of dam	Angus	Hereford	Shorthorn	Angus	Hereford	Shorthorn
Line or group*	Purebred	Purebred	Purebred	Crossbred	Crossbred	Crossbred
Bulls						
No. in group	10	13	2			
Feed regime**						
Ave. init. age	366	362	352			
Ave. init. wt.	856	823	836			
Ave.no.da.fed	140	140	140			
Ave. final wt.	1190	1164	1170			
ADG on test	2.38	2.44	2.39			
Ave. type sc.	12.7	13.2	13.0			
Ave. cond. sc.						
Ave. inbreeding	0	0	0			
Heifers						
No. in group	12	14		6	1	6
Feed regime**						
Ave. init. age	378	347		360	373	365
Ave. init. wt.	514	479		481	500	443
Ave.no.da.fed	130	130		130	130	130
Ave. final wt.	778	764		710	800	725
ADG on test	2.03	1.93		1.76	2.31	2.17
Ave. type sc.	12.2	12.2		12.5	13.0	12.5
Ave. cond. sc.						
Ave. inbreeding	0	0		0	0	0
Steers						
No. in group				On Feed	On Feed	On Feed
Feed regime**						
Ave. init. age						
Ave. init. wt.						
Ave.no.da.fed						
Ave. final wt.						
ADG on test						
Ave. type sc.						
Ave. cond. sc.						
Ave. inbreeding						

* Show if from station-owned or cooperator-owned, in addition to other group designation

**

How fed - full, limited, etc.	Bulls: Full-fed	Steers: Full-fed	Heifers: Full-fed
Pounds/day over feeding period			
Ration:			
Ground snapped corn	65%	65%	33%
Soybean meal (50%)	7%	7%	7%
Molasses	9%	9%	9%
Alfalfa meal	3%	3%	5%
Cottonseed hulls	12%	12%	27%
Johnson-grass hay	3%	3%	18%
Salt	0.5%	0.5%	0.5%
Defluorinated phosphate	0.5%	0.5%	0.5%

FORM II

Ala. (14)

POSTWEANING PERFORMANCE OF CALVES FED IN 1961

Alabama State

	Location	Auburn	Auburn	Auburn	Auburn	Auburn	Auburn
	Breed of sire	Angus	Angus	Hereford	Hereford	Shorthorn	Shorthorn
	Breed of dam	Hereford	Shorthorn	Angus	Shorthorn	Angus	Hereford
	Line or group*	Crossbred	Crossbred	Crossbred	Crossbred	Crossbred	Crossbred
Bulls	No. in group						
	Feed regime**						
	Ave. init. age						
	Ave. init. wt.						
	Ave.no.da.fed						
	Ave. final wt.						
	ADG on test						
	Ave. type sc.						
	Ave. cond, sc.						
	Ave. inbreeding						
Heifers	No. in group	1	1	3	3	2	1
	Feed regime**						
	Ave. init. age	324	318	382	338	336	397
	Ave. init. wt.	475	450	565	495	530	635
	Ave.no.da.fed	130	130	130	130	130	130
	Ave. final wt.	715	642	848	731	771	952
	ADG on test	1.85	1.48	2.18	1.81	1.87	2.44
	Ave. type sc.	10	13	13.3	12.3	13.5	14
	Ave. cond. sc.						
	Ave. inbreeding	0	0	0	0	0	0
Steers	No. in group	On feed	On feed	On feed	On feed	On feed	On feed
	Feed regime**						
	Ave. init. age						
	Ave. init. wt.						
	Ave.no.da.fed						
	Ave. final wt.						
	ADG on test						
	Ave. type sc.						
	Ave. cond. sc.						
	Ave. inbreeding						

* Show whether station-owned or cooperator-owned, in addition to other group designation

**

How fed - full, limited, etc.	Bulls	Steers: Full-fed	Heifers: Full-fed
Pounds/day over feeding period			
Ration:			
Ground snapped corn		65%	33%
Soybean meal (50%)		7%	7%
Molasses		9%	9%
Alfalfa meal		3%	5%
Cottonseed hulls		12%	27%
Johnson-grass hay		3%	18%
Salt		0.5%	0.5%
Dicalcium phosphate		0.5%	0.5%

FORM II

POSTWEANING PERFORMANCE OF CALVES FED IN 1961

Alabama State

	Location	Auburn	Auburn	Auburn	Auburn		
	Breed of sire	Angus	Angus	Hereford	Shorthorn		
	Breed of dam	H x S	S x H	A x S	H x A		
	Line or group*	Crossbred	Crossbred	Crossbred	Crossbred		
Bulls	No. in group						
	Feed regime**						
	Ave. init. age						
	Ave. init. wt.						
	Ave.no.da.fed						
	Ave. final wt.						
	ADG on test						
	Ave. type sc.						
	Ave. cond, sc.						
	Ave. inbreeding						
Heifers	No. in group	2	1	1	1		
	Feed regime**						
	Ave. init. age	381	392	384	398		
	Ave. init. wt.	490	555	545	535		
	Ave.no.da.fed	130	130	130	130		
	Ave. final wt.	722	762	795	825		
	ADG on test	1.80	1.59	1.92	2.25		
	Ave. type sc.	12.5	13	13	13		
	Ave. cond. sc.						
	Ave. inbreeding	0	0	0	0		
Steers	No. in group						
	Feed regime**						
	Ave. init. age						
	Ave. init. wt.						
	Ave.no.da.fed						
	Ave. final wt.						
	ADG on test						
	Ave. type sc.						
	Ave. cond. sc.						
	Ave. inbreeding						

* Show whether station-owned or cooperator-owned, in addition to other group designation

**

	Bulls	Steers	Heifers
How fed - full, limited, etc.			Full-fed
Pounds/day over feeding period			
Ground ~~Ratapned~~ corn			33%
Soybean meal (50%)			7%
Molasses			9%
Alfalfa meal			5%
Cottonseed hulls			27%
Johnson-grass hay			18%
Salt			0.5%
Defluorinated phosphate			0.5%

60

Ala. (16)

FORM II

POSTWEANING PERFORMANCE OF CALVES FED IN 1961

Alabama State

	Location	BlackBelt	BlackBelt	BlackBelt	BlackBelt	BlackBelt	
	Breed of sire	Hereford	Angus	Hereford	Hereford	Hereford	
	Breed of dam	Hereford	A x H	A x H	3/4H-1/4Br	1/2H-1/2Br	
	Line or group*	Crossbred	Crossbred	Crossbred	Crossbred	Crossbred	
Bulls	No. in group						
	Feed regime**						
	Ave. init. age						
	Ave. init. wt.						
	Ave.no.da.fed						
	Ave. final wt.						
	ADG on test						
	Ave. type sc.						
	Ave. cond, sc.						
	Ave. inbreeding						
Heifers	No. in group						
	Feed regime**						
	Ave. init. age						
	Ave. init. wt.						
	Ave.no.da.fed						
	Ave. final wt.						
	ADG on test						
	Ave. type sc.						
	Ave. cond. sc.						
	Ave. inbreeding						
Steers	No. in group	4	2	3	4	8	
	Feed regime**						
	Ave. init. age	402	404	410	399	394	
	Ave. init. wt.	671.2	637.5	705.0	700.0	735.6	
	Ave.n .da.fed	133	133	133	133	133	
	Ave. final wt.	994.0	1026.0	982.3	1008.0	1006.3	
	ADG on test	2.43	2.92	2.08	2.32	2.04	
	Ave. type sc.	10.5	10.0	11.3	9.2	9.8	
	Ave. cond. sc.						
	Ave. inbreeding	0	0	0	0	0	

* Sho[illegible] station owned or cooperator-owned, in addition to other group de[illegible]ion

**

	Bulls	Steers	Heifers
How fed - full, limited, etc.		Full-fed	
Pounds/day over feeding period			
Ration:			
Ground snapped corn		39.5%	
Johnson-grass hay		37.5%	
Cottonseed meal (41%)		12.0%	
Molasses		10.0%	
Salt		1.0%	

FORM III

SLAUGHTER DATA, 1961

Alabama State

Location	Auburn	Auburn	Auburn	Auburn	Auburn	Auburn
Breed of sire	Angus	Hereford	Shorthorn	Angus	Angus	Hereford
Breed of dam	Angus	Hereford	Shorthorn	Hereford	Shorthorn	Angus
Line or group	Crossbred	Crossbred	Crossbred	Crossbred	Crossbred	Crossbred
Sex	Steer	Steer	Steer	Steer	Steer	Steer
Age at Slaughter	558	567	599	561	574	610
No. slaughtered	6	3	4	2	2	2
Days in feedlot	249	249	249	249	249	249
Final feedlot wt.	991.2	1050.7	963.0	1050.0	1032.0	1166.0
Slaughter wt., live	991.2	1050.7	963.0	1050.0	1032.0	1166.0
Carcass wt., cold	615.5	624.7	589.0	654.4	640.0	709.0
Dressing percent, cold	62.2	59.4	61.2	62.4	62.0	60.8
Carcass grade, quality	12.5	11.7	12.5	13.5	12.5	12.0
Carcass grade, cutability						
Estimated percent, kidney fat						
Ribeye area/100 lbs. carcass	1.85	1.82	1.77	1.80	1.99	1.85
Marbling score						
Fat thickness* over ribeye	0.67	0.63	0.70	0.80	0.90	0.85
W-B shear force** pounds	15.5	16.9	16.8	17.4	21.9	17.7

* Use one measure - if not, indicate method.

** Indicate size of core used and how meat was cooked.

Three 1" core samples were used with average of two readings per core, oven rib roast (7th rib) cooked to internal temperature of 155°.

Ala. (18)

FORM III

SLAUGHTER DATA, 1961

Alabama State

Location	Auburn	Auburn	Auburn	Bk. Belt	Bk. Belt	Bk. Bel
Breed of sire	Hereford	Shorthorn	Shorthorn	Angus	Hereford	Herefor
Breed of dam	Shorthorn	Angus	Hereford	A x H	A x H	Herefor
Line or group	Crossbred	Crossbred	Crossbred	Crossbred	Crossbred	Crossbr
Sex	Steer	Steer	Steer			
Age at slaughter	583	585	581	537	543	535
No. slaughtered	2	4	4	2	3	4
Days in feedlot	249	249	249	133	133	133
Final feedlot wt.	1152.0	1027.5	1063.8	1026.0	982.3	994.0
Slaughter wt., live	1152.0	1027.5	1063.8	1026.0	982.3	994.0
Carcass wt., cold	716.5	625.0	652.0	578.1	558.7	569.4
Dressing percent, cold	62.2	60.8	61.4	56.3	56.9	57.3
Carcass grade, quality	11.0	12.5	12.8	10.0	11.3	10.5
Carcass grade, cutability						
Estimated percent, kidney fat				2.25	2.33	3.00
Ribeye area/100 lbs. carcass	1.77	1.82	1.61	1.91	2.12	1.99
Marbling score						
Fat thickness* over ribeye	0.60	0.60	0.80	0.37	0.27	0.32
W-B shear force** pounds	16.3	16.6	16.2	18.98	37.29	35.00

* Use one measure - if not, indicate method.

** Indicate size of core used and how meat was cooked.

Sample taken from 12th rib steak 1" thick. Deep fat fried to 155° F. internal temperature. Three 1" cores with average of two readings per core.

FORM III

SLAUGHTER DATA, 1961

Alabama State

Location	Bk. Belt	Bk. Belt				
Breed of sire	Hereford	Hereford				
Breed of dam	1/2H-1/2B	3/4H-1/4B				
Line or group	Crossbred	Crossbred				
Sex	Steer	Steer				
Age at Slaughter	527	532				
No. slaughtered	8	4				
Days in feedlot	133	133				
Final feedlot wt.	1006.3	1008.0				
aughter wt., live	1006.3	1008.0				
Carcass wt., cold	567.9	583.5				
Dressing percent, cold	56.4	57.9				
Carcass grade, quality	9.2	9.8				
Carcass grade, cutability						
Estimated percent, kidney fat	2.44	2.88				
Ribeye area/100 lbs. carcass	2.07	2.04				
Marbling score						
Fat thickness* over ribeye	0.22	0.31				
W-B shear force** pounds	30.07	32.40				

* Use one measure - if not, indicate method.

** Indicate size of core used and how meat was cooked.

University of Arkansas
Agricultural Experiment Station

I. PROJECT: Hatch 170 (S-10)

Evaluation of Performance Records of Beef Cattle

II. OBJECTIVES:

To continue to develop practical but adequate methods for identifying, evaluating and propagating the genetic potential for the production of beef. This would involve determining the kind and number of performance records necessary to prove beef sires and dams, as well as the proper use of records in planning matings.

III. PERSONNEL:

C. J. Brown, Warren Gifford, R. S. Honea, J. E. Gage, N. G. Covington and H. Williams

IV: ACCOMPLISHMENTS DURING THE YEAR:

The accompanying data sheets indicate the number of animals used in this work during the past year. Data useful in evaluating fertility, survival, rate and pattern of growth, mothering ability, feed utilization, conformation, longevity and carcasses were obtained. Monthly weights and quarterly measurement data of 663 young cattle and semi-annual weights and measurements of 384 mature cattle were taken. Type classification of all cattle was recorded. Individually fed performance test information was recorded on 98 bulls, along with group fed gains of heifer progeny.

Analysis and evaluation of existing records were continued. Two station bulletins were prepared and are in the hands of the printers. One deals with a comparison of bulls and steers for the traits which include feedlot performance, carcass cut-out and taste panel evaluation of steaks. The other bulletin deals with heritability estimates of, and genetic correlations among, gain, feed consumption, feed conversion, type score and final weight of bulls on performance test. A study of variation in feed capacity and appetites of bulls on performance test was also reported. A study of sire-environmental interactions is nearing completion.

V. FUTURE PLANS:

Continue collection of data dealing with rate and efficiency of gains, visual appraisal, growth and development patterns, mothering ability, reproduction and carcass value according to project outline.

Studies that will receive attention during the coming year include (1) completion of sire-environmental interaction study, (2) estimates of heritability and genetic correlations among measurements of body size of cows and calf production, (3) comparisons of performance of sire and offspring, (4) studies of the relationship between performance of performance-tested bulls and their carcass traits.

VI. PUBLICATIONS DURING THE YEAR:

Arosemena, J. A. 1961. Factors affecting feed capacity and roughage intake of beef bulls. Master's Thesis, University of Arkansas Library.

Brown, C. J. and J. A. Arosemena, 1961. Factors affecting appetite of beef bulls for roughage. Proceedings, Southern Section, American Society of Animal Science.

Brown, C. J. and Warren Gifford, 1962. Estimates of Heritability and genetic correlations among certain traits of performance-tested beef bulls. Proceedings, Southern Section, American Society of Animal Science - also, Arkansas Experiment Station Bulletin 653.

Brown, C. J., J. D. Bartee and P. K. Lewis, Jr. 1962. A comparison of performance records, carcass cut-out, eating quality and relationships among these traits of beef bulls and steers. Arkansas Experiment Station Bulletin 655.

Brown, C. J. 1961. Weight of beef calves as influenced by year and season of birth, sire, sex and age of dam. Arkansas Experiment Station Bulletin 641.

VII. PUBLICATIONS PLANNED:

Paper on sire-environment interactions.

Thesis and subsequent publication of genetic and environmental relationships among body measurements and cow production.

Submitted by: C. J. Brown

FORM 1

66
Ark. (3)

COW PRODUCTION, 1961 CALF CROP

Location	Arkansas Main Sta.	Main Sta.	Main Sta.	Livestock-Forestry Station		State Main Sta.
Breed of sire	Hereford	Hereford	Shorthorn	Angus	Angus	Shorthorn
Breed of dam	Hereford	Hereford	Shorthorn	Angus	Angus	Shorthorn
Line or group[1]	Spring '61	Fall '61	S '61	Sp. '61	Fall '61	Fall '61
No. cows exposed[2]	72	41	13	35	52	7
No. calves born[3]	62	29	10	27	35	7
Calving percent, born	86	71	77	77	67	100
Ave. birth date	3/25/61	10/21/61	3/17/61	2/27/61	9/25/61	10/4/61
Ave. birth wt.	69.0	68.9	68.3	61.0	61.8	66.9
Number calves weaned	52	28	10	23	29	7
Calving percent, weaned[4]	72	68	77	66	56	100
Ave. weaning age, days	183	178	186	175	181	181
Adj. A.D.G.[5]	2.0	1.8	1.8	2.1	1.8	1.7
Ave. type score[6]	11	11	11	11	11	11
Ave. condition score[6]	11	11	11	11	11	11

1 - Purebreds, grade, line, backcross, 3-breed crosses, treatment, etc.
2 - Total number put in breeding herd.
3 - Total number born, dead + alive.
4 - Number weaned divided by number of cows exposed.
5 - Indicate adjustments.
6 - 15, 16 and 17 = Fancy
12, 13 and 14 = Choice
9, 10 and 11 = Good
6, 7 and 8 = Medium

Age of calf: corrected to 180 days
Sex of calf: corrected for

FORM I

67
Ark. (4)

COW PRODUCTION, 1961 CALF CROP

Arkansas State

Location	Main Sta.	Main Sta.				
Breed of sire	Angus	Angus				
Breed of dam	Angus	Angus				
Line or group[1]	Sp. '61	Fall '61				
No. cows exposed[2]	68	60				
No. calves born[3]	60	40				
Calving percent, born	88	67				
Ave. birth date	3/21/61	10/20/61				
Ave. birth wt.	62.4	66.1				
Number calves weaned	58	35				
Calving percent, weaned[4]	85	58				
Ave. weaning age, days	180	179				
Adj. A.D.G.[5]	2.1	1.7				
Ave. type score[6]	11	11				
Ave. condition score[6]	11	11				

1 - Purebreds, grade, line, backcross, 3-breed crosses, treatment, etc.
2 - Total number put in breeding herd.
3 - Total number born, dead + alive.
4 - Number weaned divided by number of cows exposed.
5 - Indicate adjustments.
6 - 15, 16 and 17 = Fancy
12, 13 and 14 = Choice
9, 10 and 11 = Good
6, 7 and 8 = Medium

Age of dam: uncorrected
Age of calf: corrected to 180 days
Sex of calf: corrected for

Ark. (5)

FORM 11

POSTWEANING PERFORMANCE OF CALVES FED IN 1961

Arkansas State

	Location	L and F	L and F	L and F	Co-op Ma.	Co-op Ma.	Co-op Ma.
	Breed of sire	Angus	Angus	Hereford	Angus	Hereford	Angus
	Breed of dam	Angus	Angus	Hereford	Angus	Hereford	Angus
	Line or group*	S61	F60	S61	S61	F60	F60
Bulls	No. in group	12	15	6	3	8	6
	Feed regime**						
	Ave. init. age	230	240	-	-	266	208
	Ave. init. wt.	420	420	382	428	478	449
	Ave.no.da.fed	154	154	154	154	154	154
	Ave. final wt.	737	739	785	741	878	783
	ADG on test	2.06	2.08	2.48	2.03	2.62	2.17
	Ave. type sc.	69	67	70	68	73	74
	Ave. cond, sc.						
	Ave. inbreeding	5.208	2.860				
Heifers	No. in group	21	7				
	Feed regime**						
	Ave. init. age	210	210				
	Ave. init. wt.	377	374				
	Ave.no.da.fed	145	145				
	Ave. final wt.	489	470				
	ADG on test	.77	.66				
	Ave. type sc.	68	64				
	Ave. cond. sc.						
	Ave. inbreeding	4.70	3.90				
Steers	No. in group						
	Feed regime**						
	Ave. init. age						
	Ave. init. wt.						
	Ave.no.da.fed						
	Ave. final wt.						
	ADG on test						
	Ave. type sc.						
	Ave. cond. sc.						
	Ave. inbreeding						

* Show whether station-owned or cooperator-owned, in addition to other group designation

**

	Bulls	Steers	Heifers
How fed - full, limited, etc.	Full-fed		Limited
Pounds/day over feeding period			
Ration:	1/3 prairie hay, 2/3 grain mix composed of 800 lbs. corn, 400 lbs. oats, 400 lbs. CSM, 300 lbs. w. bran, 100 lbs. alfalfa meal in drylot.		Heifers were fed 2 to 4 lbs. daily of same grain mixture as bulls, on pasture.

POSTWEANING PERFORMANCE OF CALVES FED IN 1961

Arkansas State

Location		Main Sta.	Main Sta.	Main Sta.	Main Sta.	Main Sta.	Main Sta.
Breed of sire		Hereford	Ab.-Angus	Shorthorn	Hereford	Angus	Shorthorn
Breed of dam		Hereford	Ab.-Angus	Shorthorn	Hereford	Angus	Shorthorn
Line or group*		S61	S61	S61	F60	F60	F60
Bulls	No. in group	13	13	2	12	7	
	Feed regime**						
	Ave. init. age	221	220	211	236	243	
	Ave. init. wt.	340	325	318	392	463	
	Ave.no.da.fed	154	154	154	154	154	
	Ave. final wt.	687	743	584	754	840	
	ADG on test	2.00	2.26	1.73	2.41	2.45	
	Ave. type sc.	67	67	69	68	71	
	Ave. cond. sc.						
	Ave. inbreeding	2.67	6.79	7.80	2.08	3.68	
Heifers	No. in group	14	19	1	24	21	3
	Feed regime**						
	Ave. init. age	230	231	213	209	216	208
	Ave. init. wt.	367	366	343	342	407	335
	Ave.no.da.fed	154	154	154	144	144	144
	Ave. final wt.	457	474	430	426	498	456
	ADG on test	.58	.70	.56	.58	.63	.84
	Ave. type sc.	70	69	63	67	67	68
	Ave. cond. sc.						
	Ave. inbreeding	3.54	4.28	0	3.41	4.35	5.21
Steers	No. in group						
	Feed regime**						
	Ave. init. age						
	Ave. init. wt.						
	Ave.no.da.fed						
	Ave. final wt.						
	ADG on test						
	Ave. type sc.						
	Ave. cond. sc.						
	Ave. inbreeding						

* Sh[illegible] station-owned or cooperator-owned, in addition to other group designation

**

	Bulls	Steers	Heifers
Feed fed - full, limited, etc.	Full-fed		Limited
Pounds/day over feeding period			
Ration:	1/3 prairie hay, 2/3 grain mix composed of 800 lbs. corn, 400 lbs. oats, 400 lbs. CSM, 300 lbs. W.Bran, 100 lbs. alfalfa meal in drylot.		Heifers were fed 2 to 4 lbs. daily of same grain mixture as bulls, on pasture.

FORM III

SLAUGHTER DATA, 1961

Arkansas State

Location	Main Sta.	Main Sta.	Main Sta.			
Breed of sire	Hereford	Angus	Shorthorn			
Breed of dam	Hereford	Angus	Shorthorn			
Line or group	Hereford	Angus	Shorthorn			
Sex	Male	Male	Male			
Age at Slaughter	406	398	382			
No. slaughtered	5	23	2			
Days in feedlot	154	154	154			
Final feedlot wt.	674	712	611			
Slaughter wt., live	674	712	611			
Carcass wt., cold	365	406	333			
Dressing percent, cold	54.1	57.0	52.8			
Carcass grade, quality	9	9	10			
Carcass grade, cutability						
Estimated percent, kidney fat	2.1	2.0	2.0			
Ribeye area/100 lbs. carcass	2.20	2.40	2.20			
Marbling score						
Fat thickness* over ribeye	.21	.28	.29			
W-B shear force** pounds						

* Use one measure - if not, indicate method.

** Indicate size of core used and how meat was cooked.

University of Florida
Agricultural Experiment Station

I. PROJECT: 615 (not contributing to S-10)

Influence of breed composition and level of nutrition on adaptability of cattle to Central Florida.

II. OBJECTIVES:

To determine the relative productivity of cows with different proportions of English and Brahman blood when run under pasture programs designed to supply low, medium and good nutrition levels.

III. ACCOMPLISHMENTS DURING THE YEAR:

This project is in its tenth year and nearing completion. Cows of Shorthorn, 3/4 Shorthorn, 1/2 Shorthorn 1/2 Brahman, 3/4 Brahman and Brahman breeding have been mated to both Brahman and Shorthorn bulls and their performance measured on native, partially improved and highly improved pastures.

IV. RESULTS:

See Form 1

V. PUBLICATIONS DURING THE YEAR:

Reynolds, W. L., W. G. Kirk, F. M. Peacock and M. Koger. 1961. Weaning performance of crossbred and straightbred cattle on different pasture programs in Florida. Submitted to Journal of Animal Science.

Koger, M., W. L. Reynolds, W. G. Kirk, F. M. Peacock and A. C. Warnick. 1961. Reproductive performance of crossbred and straightbred cattle on different pasture programs in Florida. Journal of Animal Science, 21(1):14-19.

Carpenter, J. W., A. Z. Palmer, W. G. Kirk, F. M. Peacock and M. Koger. 1961. Slaughter and carcass characteristics of Brahman and Brahman-Shorthorn crossbred steers. Journal of Animal Science, 20(2):336-340.

Koger, M., R. W. Kidder, F. M. Peaccck, W. G. Kirk and M. W. Hammond. 1961. Crossbreeding systems in beef cattle. American Society of Animal Production, 20:908. (Abstract)

Submitted by: Marvin Koger

I. PROJECT: 627 (not contributing to S-10)

Pasture Programs and Breeding Systems for Beef Production on Flatwoods Soils of Central and North Central Florida.

II. OBJECTIVES:

To evaluate pasture programs varying in intensities of fertilization and levels of management in terms of forage production, soil nutrient balance and rate and economy of beef production.

To compare the effectiveness of different breeding systems in improving the production of beef cattle.

III. ACCOMPLISHMENTS DURING THE YEAR:

Five different pasture programs are being studied. Included is one all grass program and four clover-grass programs fertilized with varying amounts of N, P and K. The lowest fertilization rate is three hunderd pounds of 0-10-20 applied in the fall. The highest rate is nine hundred pounds of 0-10-20 plus one hundred and eighty pounds of N. Four breeding programs are being tested, including: (1) upgrading to British, (2) crisscrossing two British breeds, (3) crisscrossing British and Brahman, and (4) crisscrossing British and Santa Gertrudis.

IV. RESULTS:

See Form I

V. PUBLICATIONS DURING THE YEAR:

Cunha, T. J. and M. Koger. 1962. An example of inter-disciplinary pasture research results - animal, agronomic, economic and other aspects. Proceedings, Southern Agricultural Workers Meeting, February 5, 1962. (Abstract)

Submitted by: Marvin Koger

I. PROJECT: 717 (not contributing to S-10)

Heritability of Performance Estimates on Angus, Brahman and Hereford Cattle

II. OBJECTIVES:

To determine hertibility estimates on performance traits in Angus, Brahman and Hereford cattle at the Purebred Beef Cattle Farm at Gainesville.

III. ACCOMPLISHMENTS DURING THE YEAR:

Performance data from these herds are being accumulated for genetic analysis. Different physiological and biochemical attributes are being studied also.

IV. PUBLICATIONS DURING THE YEAR:

Howes, J. R., R. L. Shirley and J. F. Hentges, Jr. 1961. Comparative gas carrying capacity of blood from Brahman and Hereford cattle. Journal of Animal Science, 20:393. (Abstract)

Submitted by: Marvin Koger

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I. PROJECT: Hatch 752 (S-10)

Genetics of Dwarfism in Beef Cattle

II. OBJECTIVES:

To investigate genetic relationships between prevalent types of dwarfism.

To determine the influence of genetic environment on expression of the snorter dwarf gene.

To explore the physiological and biochemical aspects of dwarfs, carriers and non-carrier animals.

III. PERSONNEL:

Marvin Koger, Geneticist; A. C. Warnick, Associate Physiologist; J. F. Hentges, Associate Nutritionist; and A. E. Lorincz, Assistant Professor of Pediatrics, School of Medicine.

IV. ACCOMPLISHMENTS DURING THE YEAR:

Calves from 1961 matings are still being born. Consequently, the last year's results from test matings of various types of dwarfs will not be known until end of calving season. This will complete this phase of the project. Conclusions to date: (1) The compact animal known in Florida as the guinea is the heterozygote for the dexter bulldog gene. (2) There is some genetic or physiological relationship between the guinea and snorter dwarf, since crossing them has resulted in a Dexter bulldog and numerous resorptions. (3) The Brahman carries the snorter gene and the midget is probably the heterozygote for the snorter dwarf gene. (4) Genes carried by Florida cattle of mixed breeding modify the expression of dwarfism. Known carriers, out of Brahman-Native cows and sired by dwarf bulls, mated back to their dwarf sires have produced significantly less than the expected ratio of one-half dwarf calves.

V. FUTURE PLANS:

Cooperative work with the Medical School in acid mucopolysaccharidosis in dwarfs continues. The project is in the process of revision to expand the physiological and biochemical aspects of dwarfs, carriers and non-carriers.

VI. PUBLICATIONS DURING THE YEAR:

Dollahon, J. C., M. Koger, J. F. Hentges, and A. C. Warnick. 1961. The productivity of snorter dwarf-carrier and non-carrier Hereford cattle. Florida Academy of Science, 24:161.

Lorincz, A. E. 1961. Heritable disorders of acid mucopolysaccharide metabolism in humans and snorter dwarf cattle. Annual N. Y. Academy of Science. 91:644-658.

Submitted by: Marvin Koger

I. PROJECT: 922 (not contributing to S-10)

Angus, Brangus and Angus x Brangus crossbreds for Beef Production in the Everglades Area.

II. OBJECTIVES:

To compare the performance of straightbred Angus and Brangus cattle with rotation crosses of the two breeds for beef production in the Everglades area.

To develop a highly productive herd of cattle at the State Prison Farm through selection based on production testing.

III. ACCOMPLISHMENTS DURING THE YEAR:

Three breeding programs are being compared: (1) straight breeding two Angus, (2) straight breeding two Brangus, and (3) crisscrossing Angus and Brangus. Rigid selection is being practiced in bulls and females are being rigidly culled on reproduction and weaning weight of calf.

IV. RESULTS:

Project just getting under way.

Submitted by: Marvin Koger

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I. PROJECT: 990 (not contributing to S-10)

Breeding Beef Cattle for Adaptation to South Florida Conditions.

II. OBJECTIVES:

To compare the performance of progeny from Angus, Brahman and Hereford cattle with the three possible crisscrosses for beef production in South Florida.

To develop through selection Angus and Hereford cattle adapted to South Florida conditions.

III. ACCOMPLISHMENTS DURING THE YEAR:

Purebred herds of Angus, Hereford and Brahman cows are being developed under rigid selection and culling for performance at the Everglades Station. Produce of these herds are being compared with the three possible crisscrosses under comparable selection pressure.

IV. RESULTS:

See Form I, Everglades Station

V. PUBLICATIONS DURING THE YEAR:

Crockett, J. R., Marvin Koger, W. C. Burns, M. E. Hammond and H. L. Chapman, Jr. 1962. Genetic variations in hemoglobins and their relationship to production in beef cattle. (Submitted to Journal of Animal Science).

Meade, J. H., Jr. 1962. Influence of Heredity and Environment on Weaning Weights and Post-Weaning Weights in Beef Cattle. Ph.D. Thesis, University of Florida Library.

VI. PUBLICATIONS PLANNED:

Kidder, R. W., J. H. Meade, Jr., M. Koger and J. R. Crockett. Systems of Crossbreeding for Beef Production.

Meade, J. H., Jr., R. W. Kidder, J. R. Crockett and M. Koger. Environmental Factors Affecting Weaning Weight of Beef Cattle in the Everglades.

Submitted by: Marvin Koger

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I. PROJECT: 1003 (not contributing to S-10)

Inherent Body Size in Cattle as Related to Adaptation to Florida's Climatic Environment.

II. OBJECTIVES:

To determine the performance of three different groups of beef cattle selected respectively for: (a) large skeletal and body size, (b) adaptation to Florida climate as reflected in thrift and vitality, and (c) the combination of weight and grade to give the greatest economic returns per animal unit.

III. FUTURE PLANS:

Herd 1 will be selected exclusively for large skeletal size as determined from photographs under standard conditions. The second herd will be selected for adaptability as measured by thrift, condition score, and other visual traits. These herds will be compared for thrift, condition score, reproduction and productivity. Skeletal size will also be related to productivity on a within herd basis. The control group will be used to evaluate changes made in Herd 1 and 2.

IV. RESULTS:

Project just getting under way.

Submitted by: Marvin Koger

General publications not related to specific Florida projects:

Meade, J. H., M. E. Hammond and M. Koger. 1961. Factors Influencing performance in a Brahman herd. Proceedings, Southern Agriculture Workers, February 1961.

Hargrove, D. D., M. Koger, F. M. Peacock, J. W. Carpenter and A. C. Warnick. 1961. Expressions of hybrid vigor in beef calves. American Society of Animal Production, 20:906-907. Nov. 1961.

Cruz, V., A. C. Warnick, T. J. Cunha and M. Koger. 1961. Feed level, alfalfa and fertility in young cows. Journal of Animal Science, 20:968. (Abstract)

Koger, M. 1961. Livestock improvement in tropical America. 1961. Ceiba, Escuela Agricola Panamericana. 9(2) September 1961. pp. 41-49.

Shirley, R. L., D. D. Hargrove, Marvin Koger, Flora Palting, J. F. Easley and G. K. Davis. 1962. Water and ash content of the heart, muscle and liver of Hereford and Brahman cattle. Paper presented: American Institute of Nutrition. Atlantic City, New Jersey, April 15-19, 1962.

FORM I

78
Fla. (8)

COW PRODUCTION, 1961 CALF CROP

Florida

Location	Range Sta.	Range Sta.	Range Sta.	Range Sta.	Range Sta.	Range Sta.
Breed of sire	Brahman	Shorthorn	Shorthorn	Shorthorn	Brahman	Brahman
Breed of dam	Brahman	Shorthorn	1/4B-3/4S	1/2S-1/2B	1/2S-1/2B	3/4B-1/4S
Line or group[1]	Brahman	Shorthorn	7/8 S	3/4 S	3/4 B	7/8Brahman
No. cows exposed[2]	31	29	27	25	28	27
No. calves born[3]	23	14	18	19	20	20
Calving percent, born	74	48	67	76	72	74
Ave. birth date	2/26/61	2/2/61	2/23/61	2/3/61	2/3/61	2/23/61
Ave. birth wt.						
Number calves weaned	21	13	17	19	20	20
Calving percent, weaned[4]	68	45	63	76	72	74
Ave. weaning age, days	212	223	212	226	230	218
Adj. A.D.G.[5]	1.77	1.29	1.76	1.97	2.08	1.78
Ave. type score[6]	10	10	11	11	11	10
Ave. condition score[6]	10	9	10	11	10	10

1 - Purebreds, grade, line, backcross, 3-breed crosses, treatment, etc.
2 - Total number put in breeding herd.
3 - Total number born, dead + alive.
4 - Number weaned divided by number of cows exposed.
5 - Indicate adjustments.
6 - 15,16 and 17 = Fancy
12, 13 and 14 = Choice
9, 10 and 11 = Good
6, 7 and 8 = Medium

Age of dam: x
Age of calf: x
Sex of calf: x

FORM I

COW PRODUCTION, 1961 CALF CROP

Florida State

Location	Range Sta.	BRU	BRU	BRU	(7)	(8)
Breed of sire	Misc.	Angus	Hereford	Hereford	Santa Ger.	Hereford
Breed of dam	Misc.	2/3H-1/3A	2/3A-1/3H	2/3SG-1/3H	1/3H-1/3SG	Hereford
Line or group[1]	Misc.	AH Criss-cross	AH Criss-Cross	HSG Criss-Cross	HSG Criss-cross	Hereford
No. cows exposed[2]	306	28	27	23	25	22
No. calves born[3]	207	23	20	20	18	18
Calving percent, born	68	82	74	87	72	82
Ave. birth date	2/10/61	12/24/60	12/28/60	1/7/61	1/6/61	1/9/61
Ave. birth wt.		57	64	65	71	68
Number calves weaned	192	23	20	18	18	17
Calving percent, weaned[4]	63	82	74	78	72	77
Ave. weaning age, days	216	242	238	228	229	226
Adj. A.D.G.[5]	1.95	1.83	1.96	2.13	2.08	2.14
Ave. type score[6]	10	12	12	13	11	12
Ave. condition score[6]	10	12	12	12	11	12

1 - Purebreds, grade, line, backcross, 3-breed crosses, treatment, etc.
2 - Total number put in breeding herd.
3 - Total number born, dead + alive.
4 - Number weaned divided by number of cows exposed.
5 - Indicate adjustments. Age of dam: x
Age of calf: x
Sex of calf: x
6 - 15,16 and 17 = Fancy
12, 13 and 14 = Choice
9, 10 and 11 = Good
6, 7 and 8 = Medium

FORM I

COW PRODUCTION, 1961 CALF CROP

Florida State

Location	BRU (1)	BRU (4)	BRU (5)	BelleGlade	BelleGlade	BelleGlade
Breed of sire	Angus	Angus	Brahman	Angus	Brahman	Hereford
Breed of dam	Angus	2/3B-1/3A	2/3A-1/3B	Angus	Brahman	Hereford
Line or group[1]	British	AB Criss-cross	AB Criss-cross	Angus	Brahman	Hereford
No. cows exposed[2]	26	18	21	47	25	44
No. calves born[3]	20	14	19	44	24	44
Calving percent, born	76	78	90	94	96	100
Ave. birth date	12/28/60	1/10/61	1/3/61	10/12/60	12/9/60	12/3/60
Ave. birth wt.	64	61	57			
Number calves weaned	19	13	17	40	21	30
Calving percent, weaned[4]	73	72	81	85	84	68
Ave. weaning age, days	238	225	232	220	101	209
Adj. A.D.G.[5]	1.75	1.98	1.81	1.33	1.52	1.44
Ave. type score[6]	11	12	11	9	7	9
Ave. condition score[6]	12	11	10	11	9	11

1 - Purebreds, grade, line, backcross, 3-breed crosses, treatment, etc.
2 - Total number put in breeding herd.
3 - Total number born, dead + alive.
4 - Number weaned divided by number of cows exposed.
5 - Indicate adjustments. **Age of dam: x**
6 - 15, 16 and 17 = Fancy **Age of calf: x**
12, 13 and 14 = Choice **Sex of calf: x**
9, 10 and 11 = Good
6, 7 and 8 = Medium

FORM I

01

Fla. (11)

COW PRODUCTION, 1961 CALF CROP

Florida State

Location	BelleGlade	BelleGlade				
Breed of sire	H and A	B and H				
Breed of dam	H x A	B x H				
Line or group[1]	A x H Crisscross	B x H Crisscross				
No. cows exposed[2]	69	58				
No. calves born[3]	66	52				
Calving percent, born	96	90				
Ave. birth date	10/31/60	12/14/60				
Ave. birth wt.						
Number calves weaned	54	51				
Calving percent, weaned[4]	78	88				
Ave. weaning age, days	212	203				
Adj. A.D.G.[5]	1.47	1.77				
Ave. type score[6]	9	9				
Ave. condition score[6]	11	10				

1 - Purebreds, grade, line, backcross, 3-breed crosses, treatment, etc.
2 - Total number put in breeding herd.
3 - Total number born, dead + alive.
4 - Number weaned divided by number of cows exposed.
5 - Indicate adjustments.
6 - 15, 16 and 17 = Fancy
12, 13 and 14 = Choice
9, 10 and 11 = Good
6, 7 and 8 = Medium

Age of dam: x
Age of calf: x
Sex of calf: x

Fla. (12)

FORM III

SLAUGHTER DATA, 1961

Florida State

Location	BRU, Lot 1	BRU, Lot 2	BRU, Lot 3	BRU, Lot 4		
Breed of sire	British	H and A	B and A	H and SG		
Breed of dam	British	A x H	B x A	H x SG		
Line or group	British	H x A Crisscross	B x A Crisscross	H x SG Crisscross		
Sex	3	3	3	3		
Age at Slaughter	14 mo.	14 mo.	14 mo.	14 mo.		
No. slaughtered	12	12	11	12		
Days in feedlot	212	212	212	212		
Final feedlot wt.	928	950	848	991		
Slaughter wt., live	928	950	848	991		
Carcass wt., cold	595	610	556	635		
Dressing percent, cold	64	64	66	64		
Carcass grade, quality	12	13	11	11		
Carcass grade, cutability						
Estimated percent, kidney fat						
Ribeye area/100 lbs. carcass	1.80	1.75	1.71	1.70		
Marbling score	5	5	3	4		
Fat thickness* over ribeye						
W-B shear force** pounds	6.89	7.22	9.01	8.14		

* Use one measure - if not, indicate method.

** Indicate size of core used and how meat was cooked.

1/2-inch core, broiled, medium-well, 160° internal temperature

West Central Florida Experiment Station
Brooksville, Florida

I. PROJECT: 629, AHRD Line Project d1-5 (S-10)

Selection of Cattle for Beef Production in the Southeastern United States.

II. OBJECTIVES:

To improve the reproductive efficiency and meat producing qualities of different strains of cattle under Florida conditions.

To test various breeding systems with these cattle.

To determine if combining ability can be increased by cross-progeny testing.

III. PERSONNEL:

Marvin Koger, University of Florida, Experiment Station
William C. Burns, In Charge, West Central Florida Experiment Station
A. C. Warnick, University of Florida, Experiment Station
A. Z. Palmer, University of Florida, Experiment Station
W. G. Kirk, Range Cattle Experiment Station
R. S. Temple, Regional Coordinator, S-10

IV. ACCOMPLISHMENTS DURING THE YEAR:

1. Scope and nature of the work:

A 42' x 120' feeding shed was completed and the roof, floor and most of the cross fences in an additional 42' x 120' feeding shed were completed. A set of cattle pens was completed at the Turnley Area. Four hundred and fifty acres of land were planted to permanent pasture at the Turnley Area. Three miles of fence were completed, and approximately one mile of water line was installed - complete with water tanks - at the Turnley Area. All the physical facilities are in good condition, with a minimum amount of maintenance necessary to keep them this way.

All the Brahman x Angus cattle were disposed of to make room for cattle on the combining ability study and the increase of Hereford cattle from Miles City, Montana. The remaining herds were culled sharply to make room for the above mentioned cattle.

2. Research results:

Under the policy of culling all open cows, the calving percentage was increased to about eighty-five percent in the Brahman and Santa Gertrudis herds.

Creep-feeding did not prove to be successful on either the weaning calves or the yearlings.

The straight forty-one percent cottonseed pellets were found to be better than a commercial pellet with a multiple source of protein on a wintering study using mature cows.

The Santa Gertrudis cattle continue to wean the heaviest calves, followed by the Brahman, Hereford and Angus.

V. FUTURE PLANS:

The Genetic-Environmental Interaction Study calls for the exchange of Hereford cattle between this Station and Miles City, Montana. This study is now underway, but final approval of the project outline is pending.

The first cattle on the "Combining Ability" study were bred this year. It is planned to feed the offspring of this group and to do a detailed meats study through the cooperation of the University of Florida Experiment Station.

VI. PUBLICATIONS DURING THE YEAR:

None

VII. PUBLICATIONS PLANNED:

1. A summarization of the performance of the five breeds of beef cattle up to the time the Brahman x Angus cattle were disposed of.

2. The comparison of creep vs. non-creep on the performance of weaning calves, carry-over effect of yearlings and reprcductive performance of the five breeds of beef cattle.

Submitted by: W. C. Burns

FORM I

85
Fla., Br. (3)

COW PRODUCTION, 1961 ____ CALF CROP

Florida, Brooksville _____ State

Location	Brksvl.	Brksvl.	Brksvl.	Brksvl.	Brksvl.	
Breed of sire	Angus	Brahman		Hereford	S. Gert.	
Breed of dam	Angus	Brahman		Hereford	S. Gert.	
Line or group[1]	Angus	Brahman	Brangus	Hereford	S. Gert.	
No. cows exposed[2]	62	32	73	58	54	
No. calves born[3]	44	24	62	27	34	
Calving percent, born	71	75	85	47	63	
Ave. birth date	1/24/61	2/10/61	1/29/61	1/21/61	1/31/61	
Ave. birth wt.	62.2	61.4	69.4	68.1	71.0	
Number calves weaned	42	18	53	27	33	
Calving percent, weaned[4]	68	56	73	47	61	
Ave. weaning age, days	218	181	213	221	211	
Adj. A.D.G.[5]	1.75	1.82	2.00	1.72	1.21	
Ave. type score[6]	10.7	9.5	10.0	10.7	11.0	
Ave. condition score[6]	12.1	10.1	10.5	11.8	10.9	

1 - Purebreds, grade, line, backcross, 3-breed crosses, treatment, etc.
2 - Total number put in breeding herd.
3 - Total number born, dead + alive.
4 - Number weaned divided by number of cows exposed.
5 - Indicate adjustments.
6 - 15,16 and 17 = Fancy
12, 13 and 14 = Choice
9, 10 and 11 = Good
6, 7 and 8 = Medium

Fla., Br. (4) FORM II

POSTWEANING PERFORMANCE OF CALVES FED IN 1961

Brooksville, Florida State

	Location	Brksvl.	Brksvl.	Brksvl.	Brksvl.	Brksvl.	
	Breed of sire	Angus	Brahman	Brangus	Hereford	S. Gert.	
	Breed of dam	Angus	Brahman	Brangus	Hereford	S. Gert.	
	Line or group*	Angus	Brahman	Brangus	Hereford	S. Gert.	
Bulls	No. in group	10	11	9	8	7	
	Feed regime**						
	Ave. init. age	236	217	234	238	226	
	Ave. init. wt.	430	451	506	401	505	
	Ave.no.da.fed	155	155	155	155	155	
	Ave. final wt.	665	709	762	641	784	
	ADG on test	1.5	1.7	1.6	1.6	1.8	
	Ave. type sc.	10	10	10	9	10	
	Ave. cond. sc.						
	Ave. inbreeding						
Heifers	No. in group	12	8	12	16	11	
	Feed regime**						
	Ave. init. age	235	215	233	237	224	
	Ave. init. wt.	369	384	412	356	438	
	Ave.no.da.fed	196	196	196	196	196	
	Ave. final wt.	503	541	510	477	545	
	ADG on test	.68	.80	.50	.62	.55	
	Ave. type sc.	9.7	9.7	10.5	9.4	10.5	
	Ave. cond. sc.						
	Ave. inbreeding						
Steers	No. in group						
	Feed regime**						
	Ave. init. age						
	Ave. init. wt.						
	Ave.no.da.fed						
	Ave. final wt.						
	ADG on test						
	Ave. type sc.						
	Ave. cond. sc.						
	Ave. inbreeding						

* Sh[illegible] station-owned or cooperator-owned, d[illegible]on

**

How fed - full, limited, etc.	Bulls	Steers	Heifers
Pounds/day over feeding period	Full-fed		Limited
Ration:	Fed 2% body weight of concentrate consisting of 2 lbs. daily of 41% CSM, 1/4 lb. Alfalfa-leaf meal, 4 lbs. molasses, balance in ground snapped corn. Hay fed free choice.		Fed 2 lbs. daily of 41% CSM, citrus molasses and ground snapped corn on pasture.

Georgia Coastal Plain Experiment Station
Tifton, Georgia

I. PROJECT: Animal Husbandry 209, AHRD Line Project d1-3 (S-10)

A Study of Grading, Crisscrossing and Rotational Crossing as Breeding Systems for Commercial Beef Production.

II. OBJECTIVES:

To study the relative value of grading, crisscrossing and rotational crossing as breeding systems for commercial beef production.

To study heterotic effects in crosses between Angus and Polled Hereford breeds as compared to heterosis in crosses between these breeds and Santa Gertrudis, a breed based partially on a Brahman foundation.

To study the comparative value of the Santa Gertrudis breed with the Angus and Polled Hereford breeds.

III. PERSONNEL:

W. C. McCormick, Animal Husbandman; T. M. Clyburn, Assistant Animal Husbandman; R. L. Saffle, Food Technologist; B. L. Southwell, Head, Animal Husbandry Department.

IV. ACCOMPLISHMENTS DURING THE YEAR:

1. The foundation herds of cattle were established at the Georgia State Prison from 1954 to 1957. The three grade and crisscross herds contained around 40 breeding females each, initially, while the rotational herd had 60 females. Approximately half of these have been replaced with generation one females. Calves are born January to March and weaned in September. During breeding the cow herd is divided into bull units; thereafter, they are managed as larger groups.

2. Data recorded for the 1961 calf crop were as follows:

				Weaning information				
Herd	Breeding System	Number calves	Ave. birth wt.	Ave. age, days	Ave. wt.	ADG to weaning	Ave. type score	Ave. cond. score
Gr. A.	Grading up	34	62	224	401	1.52	10.9	10.1
Gr. PH	Grading up	34	72	215	373	1.40	10.0	8.6
Gr. SG	Grading up	29	73	217	453	1.75	8.9	9.1
A x PH	Crisscross	30	65	220	404	1.53	10.5	9.9
A x SG	Crisscross	32	71	210	413	1.63	9.6	9.1
PH x SG	Crisscross	34	73	212	412	1.60	9.2	8.9
AxPHxSG	Rotational	49	71	218	444	1.71	10.1	9.9

From the 1960 calves, eight steers each from the grade and crisscross herds and twelve from the rotational herd were grazed on small grain and millet pastures beginning in February for 224 days. The steers were slaughtered in the Prison Farm abattoir. Slaughter weight was final weight off pasture. Carcass weights are the warm weights. Dressing percent was based on this weight and the unshrunk final weight. Data recorded for these animals were as follows:

Average Performance on Growth and Carcass Data

Herd	ADG, lbs. preweaning	ADG, lbs. postweaning	Final wt., pounds	Final age, days	Wt./day of age	Slaughter grade	Carcass weight	Carcass length	Sq. in. ribeye/cwt. carcass	Carcass grade	Carcass wt./day age
A	1.58	1.59	841	578	1.46	9.0	486	46.4	1.69	9.0	.84
H	1.70	1.83	924	577	1.61	9.4	527	47.8	1.69	8.6	.92
SG	1.97	1.99	1004	568	1.77	8.5	578	49.3	1.43	8.8	1.02
AxH	1.63	1.76	905	593	1.53	9.1	530	47.1	1.71	9.0	.89
AxSG	1.75	1.84	960	573	1.68	8.7	558	47.9	1.66	9.1	.98
HxSG	2.00	1.98	1037	586	1.77	9.1	607	49.6	1.60	8.8	1.04
AxHxSG	1.85	1.84	949	573	1.66	9.0	563	48.0	1.84	9.2	.99

V. FUTURE PLANS:

Studies will be continued as planned.

VI. PUBLICATIONS DURING THE YEAR:

Routine annual reports.

VII. PUBLICATIONS PLANNED:

A summary of the data after the 1961 calves are weaned.

Submitted by: W. C. McCormick

I. PROJECT: Animal Husbandry 224, AHRD Line Project d1-3 (S-10)

Improvement of Performance and Carcass Quality in Beef Cattle Through Selection.

II. OBJECTIVES:

To develop herds of Polled Hereford and Angus cattle with superior performance.

To progeny test Polled Hereford and Angus sires with selection criteria based primarily on pre- and post-weaning growth rate, and carcass meatiness and tenderness.

III. PERSONNEL:

W. C. McCormick, Animal Husbandman; D. W. Beardsley, Associate Animal Husbandman; R. L. Saffle, Food Technologist; B. L. Southwell, Head, Animal Husbandry Department.

IV. ACCOMPLISHMENTS DURING THE YEAR:

The Polled Hereford herd of around 100 females was mated to 5 sires. Two of these sires (452 and F74) were bred to cows designated as superior (cows with one or more complete records) and to tester cows. Performance tested bulls 887, 761 and F18 were mated to tester cows (heifers, cows with incomplete records and inferior cows). The Angus herd was artificially bred to Elector of Shempston, an American Breeders Service bull; to 99, a University of Georgia bull; and naturally to 297, a selection from the Tifton herd. The cows were artificially mated during the first part of the season and naturally during the latter part.

The calves were born January to March. They were weaned September 12, 1961. The Polled Hereford heifer calves were not creep-fed; the bull calves and Angus calves were creep-fed. All bull calves were fed in dry lot for 168 days beginning at weaning. Bulls sired by F74, F18 and 887 were fed in sire groups. After weaning all heifers considered prospective breeders were grazed on permanent and annual pastures. These heifers were fed a limited amount of grain immediately following weaning until small grain pastures were ready for grazing. Thereafter, supplemental grain feeding was discontinued. The remainder of the heifers were fed in dry lot. At the end of the feeding period calves sired by F74, 887 and F18 were slaughtered to obtain carcass data. Data obtained during the year was as follows.

Growth and Feedlot Data

Breed	Sire	No. bull calves	Weaned weight	Feedlot daily gain	Ave. final age	Wt./day of age	Type score
PH	452	11	512	2.38	394	2.32	10.8
PH	F74	7	483	2.74	367	2.57	11.9
PH	887	6	423	2.46	374	2.24	10.9
PH	761	8	441	2.51	372	2.32	11.6
PH	F18	6	478	2.62	392	2.34	11.4
A	Shempston	12	456	2.51	387	2.27	11.4
A	99	4	416	2.51	384	2.19	10.7
A	297	3	415	2.70	358	2.43	11.3

Carcass Data

Breed	Sire	Number killed	Ave. dressing percent	Ave. fat thickness ribeye, in.	Ave. ribeye area/cwt. carcass	Ave. carcass wt./day of age	Ave. carcass length
PH	887	11	55.2	.43	2.28	1.10	42.4
PH	F74	8	58.2	.47	2.08	1.27	44.0
PH	F18	9	55.1	.36	2.31	1.13	43.5

Feed efficiency for bull calves sired by 887, F74 and F18 were 8.0, 7.3 and 7.0 pounds per pound gain, respectively. Steaks were taken to obtain shear force values; however, these data were incomplete at report time.

V. FUTURE PLANS:

Continue project as outlined.

VI. PUBLICATIONS DURING THE YEAR:

Routine annual reports.

VII. PUBLICATIONS PLANNED:

None

Submitted by: W. C. McCormick

* * * * * * *

I. PROJECT: State 2-99 (S-10)

Selection of Beef Cattle for Single Items of Importance in Profitable Beef Production.

II. OBJECTIVES:

To obtain preliminary information on the relative effectiveness of selecting for a single character.

To observe trends in characters for which no selection is made when selection is for a single character.

III. PERSONNEL:

W. C. McCormick, Animal Husbandman; T. M. Clyburn, Assistant Animal Husbandman; B. L. Southwell, Head, Animal Husbandry Department.

IV. ACCOMPLISHMENTS DURING THE YEAR:

A. Four herds, of fifty grade Polled Hereford breeding females each, have been established at the Georgia State Prison Farm at Reidsville. In three herds selection of replacements is based on (1) weaning weight, (2) rate of post-weaning gain, and (3) weaning score. For the fourth or "average herd" replacements are selected whose records are nearest average for each trait. Bulls for these herds are selected from the breeding groups at Tifton.

B. During the 1960 breeding period approximately 50 females in each herd were exposed. The average performance of calves in these herds was as follows:

Herd	No. calves weaned	Ave. birth weight	ADG, birth to weaning	Weaning Scores Type	Weaning Scores Condition	Rate of gain post-weaning
"Wean Weight"	41	74	1.63	11.0	9.7	.87
"Rate of Gain"	43	73	1.59	10.7	9.5	1.00
"Score"	43	67	1.46	10.4	8.8	.89
"Average"	46	70	1.43	10.5	9.1	.85

C. Records of all calves were used in all calculations except rate of post-weaning gain. Only the heifer calves (16 to 23 per head) were used in these calculations. The calves were born from January to March and weaned around September 15. Rate of post-weaning gain was calculated for the period beginning at weaning and ending April 2.

V. FUTURE PLANS:

Continue project as outlined.

VI. PUBLICATIONS DURING THE YEAR:

Routine annual reports.

VII. PUBLICATIONS PLANNED:

None

Submitted by: W. C. McCormick

FORM I

92
Ga. (6)

COW PRODUCTION, 1961 CALF CROP

Georgia State

Location	Tifton	Tifton	Reidsville	Reidsville	Reidsville	Reidsville
Breed of sire	P.Hereford	Angus	Angus	P.Hereford	S. Gert.	A. and H.
Breed of dam	P.Hereford	Angus	Gr.Angus	Gr. P. H.	Gr. S. G.	A x H
Line or group[1]	Purebred	Purebred	Gr. Angus	Gr. P. H.	Gr. S. G.	A x H
No. cows exposed[2]	96	47	39	40	39	40
No. calves born[3]	84	33	36	37	34	36
Calving percent, born	88	70	92	93	87	90
Ave. birth date	2/9/61	2/10/61	2/10/61	2/10/61	2/9/61	2/11/61
Ave. birth wt.	76	65	62	72	73	65
Number calves weaned	76	30	35	36	30	33
Calving percent, weaned[4]	79	64	90	90	77	83
Ave. weaning age, days	215	214	224	215	217	220
Adj. A.D.G.[5]	1.78	1.66	1.52	1.40	1.75	1.53
Ave. type score[6]	11.0	10.8	10.9	10.0	8.9	10.5
Ave. condition score[6]	9.9	9.8	10.1	8.6	9.1	9.9

1 - Purebreds, grade, line, backcross, 3-breed crosses, treatment, etc.
2 - Total number put in breeding herd.
3 - Total number born, dead + alive.
4 - Number weaned divided by number of cows exposed.
5 - Indicate adjustments. None
6 - 15,16 and 17 = Fancy
12, 13 and 14 = Choice
9, 10 and 11 = Good
6, 7 and 8 = Medium

FORM I

93
Ga. (7)

COW PRODUCTION, ~~1961~~ CALF CROP

Georgia State

Location	Reidsville	Reidsville	Reidsville	Reidsville	Reidsville	Reidsville
Breed of sire	A and SG	H and SG	A, PH, SG	P.Hereford	P.Hereford	P.Hereford
Breed of dam	A x SG	H x SG	AxPHxSG	Gr. PH	Gr. PH	Gr. PH
Line or group[1]	A x SG	H x SG	AxPHxSG	Wean Wt.	Score	Rate Gain
No. cows exposed[2]	39	40	60	48	48	49
No. calves born[3]	36	38	56	43	37	44
Calving percent, born	92	95	93	90	77	90
Ave. birth date	2/20/61	2/14/61	2/11/61	2/6/61	2/22/61	2/12/61
Ave. birth wt.	71	73	71	74	67	73
Number calves weaned	35	37	50	41	33	43
Calving percent, weaned[4]	90	93	83	85	69	88
Ave. weaning age, days	210	212	218	222	205	220
Adj. A.D.G.[5]	1.63	1.60	1.71	1.63	1.46	1.59
Ave. type score[6]	9.6	9.2	10.1	11.0	10.4	10.7
Ave. condition score[6]	9.1	8.9	9.9	9.7	8.8	9.5

1 - Purebreds, grade, line, backcross, 3-breed crosses, treatment, etc.
2 - Total number put in breeding herd.
3 - Total number born, dead + alive.
4 - Number weaned divided by number of cows exposed.
5 - Indicate adjustments.
6 - 15,16 and 17 = Fancy
12, 13 and 14 = Choice
9, 10 and 11 = Good
6, 7 and 8 = Medium

94
Ga. (8)

FORM I

COW PRODUCTION, 1961 CALF CROP

Georgia State

Location	Reidsville					
Breed of sire	P.Hereford					
Breed of dam	Gr. PH					
Line or group[1]	Average					
No. cows exposed[2]	49					
No. calves born[3]	46					
Calving percent,	94					
Ave. birth date	2/8/61					
Ave. birth wt.	70					
Number calves weaned	46					
Calving percent, weaned[4]	94					
Ave. weaning age, days	223					
Adj. A.D.G.[5]	1.43					
Ave. type score[6]	10.5					
Ave. condition score[6]	9.1					

1 - Purebreds, grade, line, backcross, 3-breed crosses, treatment, etc.
2 - Total number put in breeding herd.
3 - Total number born, dead + alive.
4 - Number weaned divided by number of cows exposed.
5 - Indicate adjustments.
6 - 15,16 and 17 = Fancy
12, 13 and 14 = Choice
9, 10 and 11 = Good
6, 7 and 8 = Medium

POSTWEANING PERFORMANCE OF CALVES FED IN 1961

Georgia State

	Location	Tifton	Tifton	Reidsv.	Reidsv.	Reidsv.	Reidsv.
	Breed of sire	P. H.	Angus	Angus	P. H.	S. Gert.	A,H
	Breed of dam	P. H.	Angus	Gr. Angus	Gr. P.H.	Gr. S. G.	A x H
	Line or group*	Purebred	Purebred	Grade	Grade	Grade	A x H
Bulls	No. in group	38	20				
	Feed regime**						
	Ave. init. age	226	222				
	Ave. init. wt.	491	481				
	Ave.no.da.fed	168	168				
	Ave. final wt.	902	851				
	ADG on test	2.44	2.20				
	Ave. type sc.	12.2	12.0				
	Ave. cond. sc.						
	Ave. inbreeding	-	-				
Heifers	No. in group	30	10				
	Feed regime**						
	Ave. init. age	226	221				
	Ave. init. wt.	445	440				
	Ave.no.da.fed	168	168				
	Ave. final wt.	709	672				
	ADG on test	1.57	1.38				
	Ave. type sc.	11.8	12.0				
	Ave. cond. sc.						
	Ave. inbreeding	-	-				
Steers	No. in group			8	8	8	8
	Feed regime**						
	Ave. init. age			354	353	344	~~369~~
	Ave. init. wt.			485	515	557	~~577~~
	Ave.no.da.fed			224	224	224	~~224~~
	Ave. final wt.			841	924	~~1004~~	~~905~~
	ADG on test			1.59	1.83	~~1.99~~	~~1.76~~
	Ave. type sc.			-	-	-	
	Ave. cond. sc.						
	Ave. inbreeding			-	-	-	

* Sh[illegible] owned or cooperator-owned, in addition to other group de[illegible]ion

**

How fed - full, limited, etc.	Bulls: Full-fed	Steers: Limited	Heifers: [illegible] limited
Pounds/day over feeding period			
Ration:	Per ton: 850 gr. sn. corn 200 gr. oats 150 molasses 50 Alfalfa-leaf meal 300 CSM 450 gr. Coastal hay	Grazed on small grain and millet pastures.	Replacement ~~heifers~~: Fed limited grain on perm. pasture for 84 days, grazed on small grain pasture 84 days. Rest of heifers full-fed gr. sn. corn, CSM and hay in dry lot. Heifers about equally divided between treatments.

Ga. (10)

FORM II

POSTWEANING PERFORMANCE OF CALVES FED IN 1961

Georgia State

	Location	Reidsvl.	Reidsvl.	Reidsvl.			
	Breed of sire	A, SG	H, SG	A,H,SG			
	Breed of dam	A x SG	H x SG	A x H x SG			
	Line or group*	A x SG	H x SG	A x H x SG			
Bulls	No. in group						
	Feed regime**						
	Ave. init. age						
	Ave. init. wt.						
	Ave.no.da.fed						
	Ave. final wt.						
	ADG on test						
	Ave. type sc.						
	Ave. cond, sc.						
	Ave. inbreeding						
Heifers	No. in group						
	Feed regime**						
	Ave. init. age						
	Ave. init. wt.						
	Ave.no.da.fed						
	Ave. final wt.						
	ADG on test						
	Ave. type sc.						
	Ave. cond. sc.						
	Ave. inbreeding						
Steers	No. in group	8	8	12			
	Feed regime**						
	Ave. init. age	349	362	349			
	Ave. init. wt.	548	593	537			
	Ave.no.da.fed	224	224	224			
	Ave. final wt.	960	1037	949			
	ADG on test	1.84	1.98	1.84			
	Ave. type sc.	-	-	-			
	Ave. cond. sc.						
	Ave. inbreeding	-	-	-			

* Sh[illegible]ther station-owned or cooperator-owned, in addition to other group d[illegible]ion

**

	Bulls	Steers	Heifers
How fed - full, limited, etc.		Limited	
Pounds/day over fecding period			
Ration:		Grazed on small grain and millet pastures.	

FORM III

SLAUGHTER DATA, 1961

Georgia

Location	Reidsville	Reidsville	Reidsville	Reidsville	Reidsville	Reidsville
Breed of sire	Angus	P. H.	S. G.	A,PH	A,SG	PH,SG
Breed of dam	Gr. Angus	Gr. P.H.	Gr. S.G.	A x PH	A x SG	PH x SG
Line or group	Gr. Angus	Gr. P.H.	Gr. S.G.	A x PH	A x SG	PH x SG
Sex	Steer	Steer	Steer	Steer	Steer	Steer
Age at Slaughter	578	577	568	593	573	586
No. slaughtered	8	8	8	8	8	8
Days in feedlot	224	224	224	224	224	224
Final feedlot wt.	841	924	1004	905	960	1037
Slaughter wt., live	846	933	1013	911	969	1044
Carcass wt., cold	486	527	578	530	558	607
Dressing percent, cold	57.3	56.4	57.1	58.2	57.6	58.2
Carcass grade, quality	9.0	8.6	8.8	9.0	9.1	8.8
Carcass grade, cutability						
Estimated percent, kidney fat						
Ribeye area/100 lbs. carcass	1.69	1.69	1.43	1.71	1.66	1.60
Marbling score						
Fat thickness* over ribeye	.50	.45	.56	.54	.45	.52
W-B shear force** pounds						

* Use one measure - if not, indicate method.

** Indicate size of core used and how meat was cooked.

FORM III

SLAUGHTER DATA, 1961

Georgia State

Location	Reidsville	Tifton	Tifton	Tifton	Tifton	
Breed of sire	A,PH,SG	P. H.	P. H.	P. H.	P. H.	
Breed of dam	AxPHxSG	P. H.	P. H.	P. H.	P. H.	
Line or group	AxPHxSG	Sire 747	Sire 747	Sire 853	Sire 853	
Sex	Steers	Bulls	Heifers	Bulls	Heifers	
Age at Slaughter	573	391	396	374	387	
No. slaughtered	12	4	3	4	3	
Days in feedlot	224	168	168	168	168	
Final feedlot wt.	949	838	725	803	712	
Slaughter wt., live	962	838	752	803	712	
Carcass wt., cold	563	472	412	457	406	
Dressing percent, cold	58.6	56.2	56.6	56.4	56.2	
Carcass grade, quality	9.2	7.8	8.8	7.8	9.3	
Carcass grade, cutability						
Estimated percent, kidney fat						
Ribeye area/100 lbs. carcass	1.84	2.29	2.41	2.52	2.22	
Marbling score						
Fat thickness* over ribeye	.48	.36	.42	.25	.41	
W-B shear force** pounds		8.9	11.8	8.9	7.6	

* Use one measure - if not, indicate method.

** Indicate size of core used and how meat was cooked.

University of Kentucky
Agricultural Experiment Station

I. PROJECT: 260 (S-10)

Measurement and selection of economically important traits in beef cattle.

II. OBJECTIVES:

To use rate of gain, efficiency of gain, conformation and carcass characteristics in an over-all selection experiment.

To develop a method of estimating a bull's transmitting ability for carcass characteristics, as well as rate of gain and conformation.

III. PERSONNEL:

N. W. Bradley, Associate Professor of Animal Science
D. G. Steele, Professor of Animal Science
W. P. Garrigus, Head, Department of Animal Science and Associate Director of Experiment Station
J. D. Kemp, Professor of Animal Science
W. Y. Varney, Associate Professor of Animal Science

IV. ACCOMPLISHMENTS DURING THE YEAR:

A study of the effects of sire, breed and sex on pre- and postweaning performance and carcass characteristics of Hereford and Hereford x Red Poll calves was continued. During the past year eighteen Hereford calves and nineteen crossbred calves were produced on the Mercer farm. Eighteen of these calves were sired by the low-gaining bull and nineteen were sired by the high-gaining bull. The sex ratio was thirteen heifers and twenty-four steers. These calves were weaned at about 9.5 months of age. After weaning the calves were moved to the Coldstream farm where thirty-four of them are being fed a fattening ration from small, individual self-feeders. This postweaning test will be terminated after the calves have been on feed for about 210 days. Upon completion of the postweaning test, all calves will be slaughtered and complete slaughter and carcass data will be collected. Complete results of the preweaning test and a 196-day progress report of the postweaning test are given in Table 1. These data represent the second year in which calves sired by high and low gaining Hereford bulls and out of Hereford and Red Poll cows have undergone preweaning and postweaning performance tests and carcass evaluation. The cows have now been sold and when the postweaning test and the carcass evaluation have been made, this study will have been completed.

TABLE 1. Effects of Sire, Breed and Sex on Preweaning and Postweaning Performance of Hereford and Hereford x Red Poll Calves - 1961

	Sire[1]		Breed		Sex	
	Low Gainer	High Gainer	Hereford	Hereford x Red Poll	Heifers	Steers
Preweaning:						
No. of calves	18	19	18	19	13	24
Birth weight, lbs.	72	74	69	76	68	77
Ave. age, days	285	284	283	286	285	285
Weaning weight	583	605	536	650	570	608
A.D.G.	1.80	1.87	1.65	2.01	1.78	1.86
Adj. A.D.G.[2]	1.85	1.96	1.71	2.09	1.93	1.86
Conformation score	11.3	11.0	11.4	11.0	10.8	11.0
Postweaning (196 days):						
No. of calves	16	17	17	16	11	22
Sex of calves						
Steers	11	11	12	10	--	22
Heifers	5	6	5	6	11	--
Initial weight, lbs.[3]	556	576	513	623	543	578
Final weight, lbs.	964	1038	964	1043	932	1037
Total gain, lbs.	408	462	451	420	389	459
A.D.G.	2.08	2.36	2.30	2.14	1.98	2.34
Feed/cwt. gain, lbs.	956	947	883	1019	989	929

[1] Low gaining sire - A.D.G.: 2.22; lbs./day age: 2.17; feed/cwt. gain: 828.
High gaining sire - A.D.G.: 2.94; lbs./day age: 2.69; feed/cwt. gain: 563.

[2] Adjusted for age of dam, sex of calf and season of birth.

[3] After weaning, calves were hauled 35 miles and some were dehorned. Considerable weight was lost, although only one day elapsed from weaning until starting on the postweaning phase.

During the past year 100 purebred Hereford females were made available for use in the revised project. The heifers which are old enough are now being bred to produce the 1963 calf crop.

V. FUTURE PLANS:

Future plans are to proceed according to the revised project outline as rapidly as time permits.

VI. PUBLICATIONS DURING THE YEAR:

Greathouse, T. R., N. W. Bradley, W. P. Garrigus and W. Y. Varney. 1961. Preweaning and postweaning performance and carcass characteristics of Hereford and Hereford x Red Poll crossbred calves. Kentucky Livestock Field Day Report, University of Kentucky Animal Science Mimeo. July 19, 1961.

Greathouse, T. R. 1962. Preweaning and postweaning performance and carcass characteristics of Hereford and Hereford x Red Poll crossbred calves. Ph.D. Thesis, University of Kentucky Library.

VII. PUBLICATIONS PLANNED:

Results will be published annually in the Kentucky Livestock Field Day Report and elsewhere as justified.

Submitted by: N. W. Bradley,
D. G. Steele, and
W. Y. Varney

FORM I

COW PRODUCTION, 1961 CALF CROP

Kentucky State

Location	Mercer	Mercer				
Breed of sire	Hereford	Hereford				
Breed of dam	Hereford	Red Poll				
Line or group[1]	Hereford	H x RP				
No. cows exposed[2]	20	20				
No. calves born[3]	20	20				
Calving percent, born	100	100				
Ave. birth date	1/8/61	1/15/61				
Ave. birth wt.	69	76				
Number calves weaned	18	19				
Calving percent, weaned[4]	90	95				
Ave. weaning age, days	283	286				
Adj. A.D.G.[5]	1.71	2.22				
Ave. type score[6]	10.4	11.0				
Ave. condition score[6]						

1 - Purebreds, grade, line, backcross, 3-breed crosses, treatment, etc.
2 - Total number put in breeding herd.
3 - Total number born, dead + alive.
4 - Number weaned divided by number of cows exposed.
5 - Indicate adjustments.
6 - 15,16 and 17 = Fancy
12, 13 and 14 = Choice
9, 10 and 11 = Good
6, 7 and 8 = Medium

Age of dam: x
Sex of calf: x

POSTWEANING PERFORMANCE OF CALVES FED IN 1961

Kentucky State

	Location	Mercer	Mercer				
	Breed of sire	Hereford	Hereford				
	Breed of dam	Hereford	Red Poll				
	Line or group*	Hereford	H x RP				
Bulls	No. in group						
	Feed regime**						
	Ave. init. age						
	Ave. init. wt.						
	Ave.no.da.fed						
	Ave. final wt.						
	ADG on test						
	Ave. type sc.						
	Ave. cond. sc.						
	Ave. inbreeding						
Heifers	No. in group	10	9				
	Feed regime**						
	Ave. init. age	260	270				
	Ave. init. wt.	448	548				
	Ave.no.da.fed	207	207				
	Ave. final wt.	908	982				
	ADG on test	2.22	2.10				
	Ave. type sc.	12.4	10.7				
	Ave. cond. sc.						
	Ave. inbreeding						
Steers	No. in group	7	8				
	Feed regime**						
	Ave. init. age	270	262				
	Ave. init. wt.	449	577				
	Ave.no.da.fed	207	207				
	Ave. final wt.	950	1078				
	ADG on test	2.41	2.42				
	Ave. type sc.	13.1	12.2				
	Ave. cond. sc.						
	Ave. inbreeding						

* Show whether station-owned or cooperator-owned, in addition to other group designation

**

	Bulls	Steers	Heifers
How fed - full, limited, etc.		Full-fed	Full-fed
Pounds/day over feeding period			

Ration:

	Pounds
Ground corn	1125
Ground corn cobs	400
Molasses	180
Alfalfa leaf meal	60
Soybean meal (44%)	235
Dicalcium phosphate	5
Trace mineral salt	10
Stilbosol	1
TOTAL:	2016 *

*Note: 1,000,000 I.U. of Vitamin A were added/ton of ration; ration was self-fed.

FORM III

SLAUGHTER DATA, 1961

Kentucky State

Location	Mercer	Mercer	Mercer	Mercer		
Breed of sire	Hereford	Hereford	Hereford	Hereford		
Breed of dam	Hereford	Hereford	Red Poll	Red Poll		
Line or group	Hereford	Hereford	RP x H	RP x H		
Sex	Heifer	Steer	Heifer	Steer		
Age at Slaughter	467	477	477	467		
No. slaughtered	10	7	9	8		
Days in feedlot	207	207	207	207		
Final feedlot wt.	908	950	982	1078		
aughter wt., live	866	912	929	1053		
Carcass wt., cold	523	561	574	649		
Dressing percent, cold (a)	60.4	61.5	61.8	61.6		
Carcass grade, quality (b)	12.4	12.1	11.3	12.1		
Carcass grade, cutability						
Estimated percent, kidney fat						
Ribeye area/100 lbs. carcass	1.92	1.76	1.64	1.75		
Marbling score (c)	7.3	6.4	6.7	5.75		
Fat thickness* over ribeye	0.74	0.78	0.96	0.72		
W-B shear force** pounds	16.3	17.1	19.2	16.2		

* Use one measure - if not, indicate method.

** Indicate size of core used and how meat was cooked.

One-inch cores - roasted at 325° to an internal temperature of 160° in an electric oven.

(a) Six-hour shrunk weight (3 hour haul) and 72 hour cold weight.

(b) Federal grader.

(c) Estimated by University meats man; 6 = modest, 7 = moderate.

Louisiana State University
Agricultural Experiment Station

I. PROJECT: 605 (S-10)

Comparison of Various Crossbred Cattle Under Gulf Coast Conditions with Respect to Rate of Growth on Pasture, Fattening Ability and Meat Quality of Steers.

II. OBJECTIVES:

To study types and breeds of beef cattle to determine which are best suited to Gulf Coast conditions, with respect to rate of growth, fattening ability and meat quality.

To study various crossbreeding programs as to practicality, production and usefulness.

To study the amount of hybrid vigor obtained through crossing beef breeds and to ascertain how much of this hybrid vigor is maintained through subsequent backcrossing, multiple breed crossing and rotational crossing.

To study the productive ability of dams of various breeds and breed crosses.

To estimate genetic parameters.

To study practical problems of management and marketing of crossbred cattle in the Gulf Coast area.

III. PERSONNEL:

Noah England, A. M. Mullins, R. F. Bouleware, G. L. Robertson, S. E. McCraine, Chester Phillips, Dorothy Wilson, Kenneth Koonce, John Sullivan and C. L. Seger.

IV. ACCOMPLISHMENTS DURING THE YEAR:

1. Scope and nature of work:

Two new hay barns have been built. An additional ten acres of land and a small quonset type barn have also been obtained. A steer feed lot has been constructed for the purpose of dry lot feeding the steers on the crossbreeding project. This lot consists of a concrete slab 25' wide by 200' long on which the steers are fed; and approximately one acre of land enclosed as a loafing area. A lagoon 25' x 200' x 5' was dug immediately behind the slab to solve the problem of manure disposal. A working chute for calves has been added to existing facilities.

Bulls being used this year include five of the bulls that were used for the first time during the 1961 breeding season and six two-year-old bulls (one of each breed) that were bought as weanling calves in the fall of 1960 and subsequently performance tested. Both Charolais bulls used during the 1961 season were found to be infected with Trichomonas fetus and were discarded. Only one of these bulls was scheduled for use during the 1962 breeding season. He has been replaced by a Charolais bull given to LSU by Mr. Harl Thomas of Raymondville, Texas. A bull calf of each breed (Angus, Brahman, Brangus, Charolais, Hereford and Shorthorn) was purchased in the fall of 1961, and these calves are being performance tested. They will be used in the crossbreeding project in the 1963 breeding season. One group of 1/2 and 3/4 Charolais cows is being used in a synchronization of estrus study and will be bred artificially to a Charolais bull owned by Mr. H. M. Kimball of Maringouin, Louisiana.

2. Research results:

The backcross phase of the project was terminated with the 1960 calves and the 1961 calf crop was produced under the revised breeding plan (Table 1). Preweaning performance records were kept on 98 steer and 104 heifer calves. The calves were weaned at an average age of 205 days. The steers were placed in the feed lot on October 17, 1961, and will be slaughtered May 22, 1962, at which time carcass information will be taken. All the heifers were put into pasture with vasectomized bulls in order to determine age at first estrus.

Table 1. Revised Breeding Plan

Females	Bulls					
	Her.	An.	Bra.	BA	Char.	S-horn
Hereford	12	4	4	4	4	4
Hereford-Angus + reciprocal	4	4	4	4	4	4
Hereford-Brahman + reciprocal	4	4	4	4	4	4
Hereford-Brangus + reciprocal	4	4	4	4	4	4
Angus	4	12	4	4	4	4
Angus-Brahman + reciprocal	4	4	4	4	4	4
Angus-Brangus + reciprocal	4	4	4	4	4	4
Brahman	4	4	12	4	4	4
Brahman-Brangus + reciprocal	4	4	4	4	4	4
Brangus	4	4	4	12	4	4
Charolais-Angus					4	
Charolais-Brahman					4	
Charolais-Brangus					4	
Charolais-Hereford					4	
Shorthorn-Angus						4
Shorthorn-Brahman						4
Shorthorn-Brangus						4
Shorthorn-Hereford						4

The preweaning performance of calves produced by four mating systems tends to confirm the value of the crossbred dam (Table 2). A summary of preweaning performance by breed of sire is given in Table 3.

TABLE 2. Preweaning Performance of 1961 Calves Produced by Four Mating Systems

Group	No. of Calves	Adjusted 205-day Wng. Wt.	Feeder Calf Grade	Ave. Daily Gain	Index*
Straightbreds	30	396	Medium +	1.52	105.7
Single crosses	49	427	Good -	1.61	113.4
Backcrosses	61	466	Good -	1.90	122.5
Three-breed crosses	63	457	Good -	1.83	120.9

TABLE 3. Preweaning Performance of 1961 Calves by Sire Groups

Breed of Sire	Number of Calves	Adjusted Wng. Wt.	Feeder Calf Grade	Average Daily Gain	Index*
Angus	37	414	Good -	1.59	111.7
Brahman	33	420	Medium +	1.62	109.7
Brangus	32	445	Good -	1.73	116.9
Charolais	42	482	Medium +	1.88	123.9
Hereford	17	454	Good	1.76	121.7
Shorthorn	30	446	Good	1.73	120.8

* The index combines weaning weight and weaning grade into a single numerical value which is a measure of the over-all merit of the calf. The index is obtained by the following: Index = 0.214 x adjusted weaning weight + 2.5 x weaning grade. An index of 100 designates the "average" calf and would be a calf that had an adjusted 205-day weight of 350 pounds that grades Middle Good.

The study on age at puberty has been continued and age at first heat has been recorded on all 1959 and 1960 heifers. The two-year average is given by breed in Table 4. In general, age of crossbred heifers at first estrus is intermediate between the parental breeds, indicating the mode of inheritance to be largely additive in nature.

A summary has been made of the means of sire groups for weaning traits, feed test and carcass traits for the three-year period covering the backcross phase of this experiment (Tables 5 and 6). In general, 1/2 Brahman cows produced significantly heavier calves than the other breed groups within a sire.

TABLE 4. Age at Puberty of Straightbred and Crossbred Heifers

Breed	Heifers	Ave. Age at First Heat
Angus	1	-----*
Angus	3	378.3
Brahman	4	540.2
Brahman	6	-----*
Brangus	2	584.0
Brangus	2	-----*
Hereford	9	470.4
A x A-B	2	460.0
A x A-BA	4	480.8
A x A-H	3	449.0
Average		465.2
B x B-BA	3	517.6
B x B-BA	2	-----*
B x B-A	4	552.0
B x B-A	2	-----*
B x B-H	1	548.3
B x B-H	2	-----*
Average		539.7
BA x BA-A	4	482.0
BA x BA-H	4	418.5
BA x BA-B	4	487.0
Average		462.3
C x C-BA	4	459.0
C x C-A	6	490.3
C x C-H	8	467.5
C x C-H	1	-----*
C x C-B	5	497.6
Average		478.5
H x H-BA	9	476.3
H x H-A	6	493.5
H x H-B	8	452.4
Average		472.5
S x S-BA	3	460.0
S x S-A	6	425.0
S x S-H	6	437.2
S x S-B	9	419.6
Average		430.4

* Heifers not cycling by the age of 24 months.

No particular trend was noted in cold dressing percent. A considerable difference was found between calves from the different breeds of sire for weaning weight, daily gain, carcass grade, cold dressing percent, fat thickness, cold carcass weight, tenderness, weight per day of age, percent bone and percent fat. The average values for these measurements are given by sire groups in Tables 5 and 6. The Charolais backcross calves had a significantly greater weaning weight, daily gain on feed and weight per day of age than the other groups. The Brahman bulls sired calves that were lower in daily gain on test than the other breed groups. The calves from the Charolais and Brahman sires were significantly lower than the other breed groups in both carcass grade and fat thickness. The Angus and Shorthorn sire groups were higher than the other breeds in both carcass grade and fat thickness. The Angus and Hereford sired calves were more tender than the other four groups. The calves from Charolais sires had significantly heavier carcasses while the calves from Brahman sires had lower carcass weights than the other groups. The Brahman sired calves were heavier in percent bone than were the remaining groups. Calves from Angus and Shorthorn sires were significantly lower in percent bone than the calves from other sire groups.

During the 1961 breeding season, two bulls to be used in the cross-breeding project were found to be infected with Trichomonas fetus. Replacements were not available. Due to time limitations, the bulls were treated and entered into their respective herds without opportunity to evaluate the results of the treatment. Semen was evaluated as satisfactory. Two months after termination of the 90-day breeding season, at the time of pregnancy palpation, the cervical mucus of all open cows was examined for trichomonads. Encometritis and pyometra (mild uterine inflammations) are uterine abnormalities which occur with, or after, trichomoniasis. Presence of these abnormalities was evaluated by uterine palpation and gross and microscopic observation of cervical mucus. Results of observations at the time of pregnancy-palpation are presented in Table 7. Vibrio fetus was also isolated from an open cow in one of the herds at palpation time. The percentage of cows pregnant in the Vibrio infected herd was 60%, as compared with 84% pregnancy in the clean herds.

TABLE 5. Means of Sire Groups for Weaning Traits Over Three Year Period (1958-59-60)*

	No. of Calves	Weight	Weaning Weight**	Slaughter Grade	Grade
A x A	5	80	398	7.7	8.3
A x A-B	13	71	546	10.1	11.2
A x A-BA	13	73	468	9.1	10.2
A x A-H	14	96	462	8.5	9.6
Sire Ave.	45	72	475	8.9	10.0
B x B-A	12	78	536	9.3	10.6
B x B	8	67	441	8.2	9.8
B x B-BA	20	75	480	8.9	10.2
B x B-H	19	80	528	9.4	10.9
Sire Ave.	59	75	496	9.0	10.4
BA x BA-A	7	79	492	8.8	10.1
BA x BA-B	6	70	514	9.3	10.6
BA x BA	12	75	527	9.0	10.3
BA x BA-H	12	78	515	10.0	10.9
Sire Ave.	37	76	512	9.3	10.5
C x C-A	16	85	498	8.1	9.8
C x C-B	11	80	588	9.1	11.1
C x C-BA	16	91	522	8.9	10.9
C x C-H	13	94	520	8.8	10.3
Sire Ave.	56	88	532	8.8	10.4
H x H-A	13	80	466	9.1	10.3
H x H-B	20	75	564	10.5	11.5
H x H-BA	21	78	505	9.6	10.6
H x H	15	76	454	8.0	9.3
Sire Ave.	69	77	498	9.3	10.4
S x S-A	17	71	436	8.0	9.1
S x S-B	21	73	540	10.1	11.3
S x S-BA	16	74	483	9.2	10.5
S x S-H	19	75	459	8.8	9.7
Sire Ave.	73	73	480	9.0	10.1

* Includes steers and heifers.

** Adjusted to 214 days of age, steer basis and 7-year-old dam basis.

TABLE 6. Means of Feed Test* and Carcass Traits of Steers For Three Year Period (1958-59-60)

Mating	No. of Calves	Daily Gain on Test 168-day	Wt./day of Age	Carcass Grade**	Cold Carcass Weight	Rib eye Area†	Fat Thickness (cm.)	Tenderness††	Cold Dressing Percent
A x A	3	2.2	1.7	10.7	431	10.0	0.5	13.3	57
A x A-B	8	1.7	1.8	8.9	463	8.5	1.4	16.3	58
A x A-BA	8	1.8	1.7	10.0	436	8.2	1.1	17.0	59
A x A-H	7	1.8	1.7	9.6	406	8.4	1.0	14.9	56
Sire Ave.	26	1.8	1.7	9.7	431	8.5	1.0	15.7	57
B x B-A	5	1.4	1.7	8.2	410	8.0	0.6	20.1	58
B x B	3	1.7	1.8	6.7	397	8.4	0.2	17.1	57
B x B-BA	12	1.3	1.6	7.1	390	8.0	0.5	20.2	58
B x B-H	11	1.5	1.8	7.0	426	7.8	0.7	19.6	58
Sire Ave.	31	1.4	1.7	7.3	407	9.0	0.6	19.8	58
BA x BA-A	2	1.6	1.8	9.0	383	8.7	0.6	17.8	58
BA x BA-B	3	1.5	1.8	7.2	411	8.2	0.8	18.3	59
BA x BA	6	1.8	1.8	8.7	429	9.6	0.6	18.7	58
BA x BA-H	6	1.9	1.9	9.2	438	8.6	1.0	16.8	58
Sire Ave.	17	1.7	1.8	8.6	419	8.8	0.8	17.9	58
C x C-A	8	2.0	1.9	7.7	466	9.6	0.7	18.2	58
C x C-B	4	1.9	2.1	7.1	472	9.8	0.3	21.0	57
C x C-BA	12	2.0	2.0	7.1	469	10.3	0.5	15.3	58
C x C-H	5	1.9	1.9	7.0	468	10.3	0.6	17.7	58
Sire Ave.	29	2.0	2.0	7.2	469	10.0	0.5	17.8	58
H x H-A	7	2.0	1.8	8.9	432	8.4	0.8	14.8	58
H x H-B	12	1.7	1.8	8.6	493	8.2	0.9	17.5	58
H x H-BA	10	1.7	1.7	8.5	412	7.5	0.8	15.7	57
H x H	6	1.7	1.6	7.6	370	7.7	0.6	18.3	55
Sire Ave.	35	1.8	1.7	8.4	427	8.2	0.8	16.6	57
S x S-A	9	1.8	1.5	8.9	390	7.5	0.9	19.9	57
S x S-B	8	1.8	1.8	8.8	471	8.1	1.0	20.1	60
S x S-BA	7	1.8	1.7	9.7	442	8.2	0.9	19.4	59
S x S-H	9	1.8	1.6	9.4	410	8.1	1.0	17.4	57
Sire Ave.	33	1.8	1.6	9.2	429	8.0	1.0	19.2	58

* 168-day feed test on pastures with 8 lbs. concentrate.

** Carcass grades are designated the same as slaughter grades in Table 5.

† Average area of longissimus dorsi muscle as measured at the 12th rib with a planimeter.

†† Based on a mechanical shearing test; lower shear values indicate more tender cuts.

TABLE 7. Results of Uterine Examinations 60 Days After Termination of Breeding Season

Herd	Cows Pregnant	Percent Pregnant	Uterine abnormalities in open cows	
			Trichomonads Observed	Endometrites or Pyometra
No. 7**	16/26	62	2/10	8/10
No. 8**	8/28	29	1/20	5/20
Vibrio + Herd 11	16/27	60	0/11*	3/11
Clean Herds	215/256	84	0/41	3/41

*Vibrio fetus isolated.
**Herds in which infected bulls were used.

V. FUTURE PLANS:

A. Continue the breeding plan so that contemporary information may be obtained on straightbred, single cross, backcross and three-breed calves.

B. Alter feed lot facilities so that steers may be fed by sire groups.

C. Continue grading up Charolais herd so that more information can be obtained on the merit of this breed.

D. Continue obtaining replacement bulls as weanling calves and performance test them before they are used on the crossbreeding project.

E. Retain three-breed cross heifers so that a rotational crossbreeding system can be instituted.

VI. PUBLICATIONS DURING THE YEAR:

Brown, D. D., A. M. Mullins, R. F. Boulware and R. S. Temple. 1961. Cutability index of crossbred beef carcasses as associated with other traits. Journal of Animal Science, 20:394. (Abstract)

Damon, R. A., Jr., W. R. Harvey, C. B. Singletary, S. E. McCraine and R. M. Crown. 1961. Genetic analysis of crossbreeding beef cattle. Journal of Animal Science, 20:849.

First Livestock Producers' Day Report. 1961. Animal Industry Department Louisiana State University and Agricultural Experiment Station, AI Mimeo Cir. 61-3 through 61-14 and AI Mimeo Cir. 60-14. Pages 1 through 37.

Second Livestock Producers' Report. 1962. Animal Industry Department, Louisiana State University and Agricultural Experiment Station. Pages 18 through 31 and pages 34 through 43.

Sullivan, John S., Jr., R. S. Temple and B. R. Farthing. 1961. Factors affecting grades of purebred and crossbred calves. Journal of Animal Science, 20:912. (Abstract)

Temple, R. S. and S. H. Fowler. 1961. Which is the best beef cross? Progressive Farmer. December 1961, p. 17.

Temple, R. S. and D. D. Miller. 1961. A comparison of calving percentages and pre-weaning performance of various breeds of beef cattle in a crossbreeding program. Journal of Animal Science, 20:392. (Abstract)

Temple, R. S. and G. L. Robertson. 1961. Effect of creep feeding on growth rate, grade and economy of production of crossbred beef calves in the Gulf Coast region. Journal of Animal Science, 20:399. (Abstract)

Temple, R. S., J. S. Sullivan, Jr., B. R. Farthing and G. L. Robertson. 1961. Genetic and environmental effects in purebred and backcross calves. Journal of Animal Science, 20:912. (Abstract)

Temple, R. S., R. B. Myers, L. L. Rusoff, L. D. Newsom, W. P. Barthel, C. Corley and A. Allsman. 1961. Residues of heptachlor epoxide in body tissues of beef cattle. Journal of Animal Science, 20:920. (Abstract)

Mullins, A. M. and S. H. Fowler. 1962. What makes a steak tender. Progressive Farmer, April 1962, p. 49.

VII: PUBLICATIONS PLANNED:

England, Noah and S. H. Fowler. A review of beef cattle crossbreeding at Louisiana State University.

England, Noah. An estimate of the effect of breed and weaning weight upon age at first estrus in straightbred and crossbred beef heifers.

Hendry, James. Estimates of factors affecting birth weight and the relationship of birth weight to subsequent performance. Master's Thesis.

Koonce, Kenneth. A comparison of the relative merits of three mating systems for beef cattle production. Master's Thesis.

Sullivan, J. S., R. S. Temple and B. R. Farthing. Estimates of environmental factors that affect growth rate of straightbred and crossbred calves at four average ages. To be submitted to the Journal of Animal Science.

Brown, D. D., A. M. Mullins, R. S. Temple, Noah England, R. F. Boulware and J. S. Sullivan, Jr. Relationships between certain carcass characteristics of purebred and crossbred cattle. To be submitted to the Journal of Animal Science.

Submitted by: Noah C. England

FORM I

COW PRODUCTION, 1961 CALF CROP

Louisiana State

Location	LSU	LSU	LSU	LSU	LSU	LSU
Breed of sire	Angus	Angus	Brahman	Brahman	Brangus	Brangus
Breed of dam	Straight-bred	Single-crosses	Straight-breds	Single-crosses	Straight-breds	Single-crosses
Line or group[1]						
No. cows exposed[2]	24	24	24	24	23	24
No. calves born[3]	17	20	18	17	15	21
Calving percent,	71	83	75	71	65	88
Ave. birth date	3/1/61	2/21/61	2/22/61	3/4/61	2/24/61	2/25/61
Ave. birth wt.	62	64	65	72	65	67
Number calves weaned	17	20	17	16	14	18
Calving percent, weaned[4]	71	71	71	67	61	75
Ave. weaning age, days	196	205	202	193	201	196
Adj. A.D.G.[5]	1.50	1.68	1.58	1.70	1.65	1.80
Ave. type score[6]	9.2	9.9	8.1	8.4	9.1	9.0
Ave. condition score[6]	8.0	8.8	8.0	7.9	7.7	8.2

1 - Purebreds, grade, line, backcross, 3-breed crosses, treatment, etc.
2 - Total number put in breeding herd.
3 - Total number born, dead + alive.
4 - Number weaned divided by number of cows exposed.
5 - Indicate adjustments. All calves given a constant birth weight of 40 pounds.
6 - 15,16 and 17 = Fancy
12, 13 and 14 = Choice
9, 10 and 11 = Good
6, 7 and 8 = Medium

FORM I

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La. (11)

COW PRODUCTION, 1961 CALF CROP

Louisiana State

Location						
Breed of sire	Charolais	Charolais	Hereford	Hereford	Shorthorn	Shorthorn
Breed of dam	Straight-breds	Single crosses	Straight-breds	Single crosses	Straight-breds	Single crosses
Line or group[1]						
No. cows exposed[2]	14	39	24	24	13	39
No. calves born[3]	8	30	14	15	9	19
Calving percent, born	57	77	58	63	69	49
Ave. birth date	3/27/61	3/29/61	2/21/61	2/27/61	3/9/61	3/20/61
Ave. birth wt.	67	86	68	72	62	71
Number calves weaned	6	26	12	14	8	19
Calving percent, weaned[4]	43	67	50	58	62	49
Ave. weaning age, days	170	166	209	198	192	181
Adj. A.D.G.[5]	1.51	1.86	1.67	1.89	1.57	1.83
Ave. type score[6]	7.6	8.7	9.7	10.9	10.2	10.7
Ave. condition score[6]	6.5	7.4	8.2	9.2	9.2	9.6

1 - Purebreds, grade, line, backcross, 3-breed crosses, treatment, etc.
2 - Total number put in breeding herd.
3 - Total number born, dead + alive.
4 - Number weaned divided by number of cows exposed.
5 - Indicate adjustments. All calves given a constant birth weight of 40 pounds.
6 - 15, 16 and 17 = Fancy
12, 13 and 14 = Choice
9, 10 and 11 = Good
6, 7 and 8 = Medium

FORM II

POSTWEANING PERFORMANCE OF CALVES FED IN 1961

Louisiana State

	Location	LSU	LSU	LSU	LSU	LSU	LSU
	Breed of sire	Angus	Angus	Angus	Brahman	Brahman	Brangus
	Breed of dam	A-BA	A-H	A-B	B-BA	B-H	BA
	Line or group*						
Bulls	No. in group						
	Feed regime**						
	Ave. init. age						
	Ave. init. wt.						
	Ave.no.da.fed						
	Ave. final wt.						
	ADG on test						
	Ave. type sc.						
	Ave. cond, sc.						
	Ave. inbreeding						
Heifers	No. in group						
	Feed regime**						
	Ave. init. age						
	Ave. init. wt.						
	Ave.no.da.fed						
	Ave. final wt.						
	ADG on test						
	Ave. type sc.						
	Ave. cond. sc.						
	Ave. inbreeding						
Steers	No. in group	5	4	3	4	4	2
	Feed regime**						
	Ave. init. age	267	260	286	260	268	228
	Ave. init. wt.	484	419	560	472	498	412
	Ave.no.da.fed	168	168	168	168	168	168
	Ave. final wt.	786	740	847	681	740	698
	ADG on test	1.8	1.9	1.7	1.2	1.4	1.7
	Ave. type sc.	9	9	9	7	7	8
	Ave. cond. sc.						
	Ave. inbreeding						

* Show whether station-owned or cooperator-owned, in addition to other group designation

**

	Bulls	Steers	Heifers
How fed - full, limited, etc.		Full-fed	
Pounds/day over feeding period			
Ration:		8 lbs./head/day of concentrate ration (5 parts steel cut yellow corn, 2 parts crimped oats, 1 part CSM, 1 part soybean oil meal and 1 part wheat bran) + oat and rye pasture.	

FORM II

POSTWEANING PERFORMANCE OF CALVES FED IN 1961

Louisiana State

	Location	~~LSU~~	~~LSU~~	~~LSU~~	LSU	LSU	LSU
	Breed of sire	~~Brangus~~	~~Brangus~~	~~Charolais~~	Charolais	Charolais	Charolais
	Breed of dam	~~BA-H~~	~~BA-B~~	~~C-BA~~	C-A	C-H	C-B
	Line or group*						
Bulls	No. in group						
	Feed regime**						
	Ave. init. age						
	Ave. init. wt.						
	Ave.no.da.fed						
	Ave. final wt.						
	ADG on test						
	Ave. type sc.						
	Ave. cond, sc.						
	Ave. inbreeding						
Heifers	No. in group						
	Feed regime**						
	Ave. init. age						
	Ave. init. wt.						
	Ave.no.da.fed						
	Ave. final wt.						
	ADG on test						
	Ave. type sc.						
	Ave. cond. sc.						
	Ave. inbreeding						
Steers	No. in group	3	2	4	2	2	1
	Feed regime**						
	Ave. init. age	257	208	258	265	238	288
	Ave. init. wt.	465	455	532	568	535	675
	Ave.no.da.fed	168	168	168	168	168	168
	Ave. final wt.	847	675	852	886	856	955
	ADG on test	2.3	1.3	1.9	1.9	1.9	1.7
	Ave. type sc.	10	8	5	7	6	3
	Ave. cond. sc.						
	Ave. inbreeding						

* Show whether station-owned or cooperator-owned, in addition to other group designation

**

	Bulls	Steers	Heifers
How fed -- full, limited, etc.		Full-fed	
Pounds/day over feeding period			
Ration:		Steers fed 8 lbs./ head/day of conc. ration (5 parts steel cut yellow corn, 2 parts crimped oats, 1 part CSM, 1 part soy-bean oil meal and 1 part wheat bran) + oat and rye pasture.	

La. (14)

POSTWEANING PERFORMANCE OF CALVES FED IN 1961

Louisiana State

	Location	LSU	LSU	LSU	LSU	LSU	LSU
	Breed of sire	Hereford	Hereford	Hereford	Shorthorn	Shorthorn	Shorthorn
	Breed of dam	H-BA	H-A	Hereford	S-BA	S-A	S-H
	Line or group*						
Bulls	No. in group						
	Feed regime**						
	Ave. init. age						
	Ave. init. wt.						
	Ave.no.da.fed						
	Ave. final wt.						
	ADG on test						
	Ave. type sc.						
	Ave. cond, sc.						
	Ave. inbreeding						
Heifers	No. in group						
	Feed regime**						
	Ave. init. age						
	Ave. init. wt.						
	Ave.no.da.fed						
	Ave. final wt.						
	ADG on test						
	Ave. type sc.						
	Ave. cond. sc.						
	Ave. inbreeding						
Steers	No. in group	4	2	2	3	4	5
	Feed regime**						
	Ave. init. age	258	276	247	246	271	275
	Ave. init. wt.	484	440	410	442	371	447
	Ave.no.da.fed	168	168	168	168	168	168
	Ave. final wt.	754	810	696	733	684	763
	ADG on test	1.6	2.2	1.7	1.7	1.9	1.9
	Ave. type sc.	9	10	9	9	10	10
	Ave. cond. sc.						
	Ave. inbreeding						

* Show whether station-owned or cooperator-owned, in addition to any other [illegible] designation

**

	Bulls	Steers	Heifers
How fed - full, limited, etc.		Full-fed	
Pounds/day over feeding period			
Ration:		Fed 8 lbs./head/day concentrate ration (5 parts steel cut yellow corn, 2 parts crimped oats, 1 part CSM, 1 part soybean oil meal and 1 part wheat bran) + oat and rye pasture.	

FORM II

POSTWEANING PERFORMANCE OF CALVES FED IN 1961

Louisiana State

Location	~~LSU~~					
Breed of sire	~~Shorthorn~~					
Breed of dam	~~S-B~~					
Line or group*						
Bulls						
No. in group						
Feed regime**						
Ave. init. age						
Ave. init. wt.						
Ave.no.da.fed						
Ave. final wt.						
ADG on test						
Ave. type sc.						
Ave. cond, sc.						
Ave. inbreeding						
Heifers						
No. in group						
Feed regime**						
Ave. init. age						
Ave. init. wt.						
Ave.no.da.fed						
Ave. final wt.						
ADG on test						
Ave. type sc.						
Ave. cond. sc.						
Ave. inbreeding						
Steers						
No. in group	3					
Feed regime**						
Ave. init. age	274					
Ave. init. wt.	518					
Ave.no.da.fed	168					
Ave. final wt.	829					
ADG on test	1.9					
Ave. type sc.	10					
Ave. cond. sc.						
Ave. inbreeding						

* Sh[illegible] owned or cooperator-owned, in addition to other group de[illegible]on

**

	Bulls	Steers	Heifers
How fed - full, limited, etc.		Full-fed	
Pounds/day over feeding period			
Ration:		Fed 8 lbs./head/day conc. ration (5 parts steel cut yellow corn, 2 parts crimped oats, 1 part CSM, 1 part soybean oil meal and 1 part wheat bran) + oat and rye pasture.	

FORM III

SLAUGHTER DATA, 1961

	Louisiana					State
Location	LSU	LSU	LSU	LSU	LSU	LSU
Breed of sire	Angus	Angus	Angus	Brahman	Brahman	Brangus
Breed of dam	A-BA	A-H	A-B	B-BA	B-H	BA
Line or group						
Sex	Steer	Steer	Steer	Steer	Steer	Steer
Age at Slaughter	434.6	428.5	454.3	428.5	435.5	395.5
No. slaughtered	5	4	3	4	4	2
Days in feedlot	168	168	168	168	168	168
Final feedlot wt.	785.8	740.0	846.7	680.8	739.5	698.5
Slaughter wt., live	785.8	740.0	846.7	680.8	739.5	698.5
Carcass wt., cold	473.8	430.8	507.3	408.8	446.5	404.5
Dressing percent, cold	60.23	58.14	59.89	60.01	60.29	57.81
Carcass grade, quality	9.20	9.25	8.33	6.25	6.25	9.00
Carcass grade, cutability						
Estimated percent, kidney fat	2.09	2.46	2.18	1.39	1.43	2.45
Ribeye area/100 lbs. carcass	3.67	2.12	1.72	2.04	1.82	2.17
Marbling score	2.6	2.8	1.8	1.5	1.8	2.5
Fat thickness* over ribeye	1.41	1.37	1.53	0.76	1.15	0.80
W-B shear force** pounds	13.17	13.58	15.14	24.00	21.42	19.44

* Use one measure - if not, indicate method.

** Indicate size of core used and how meat was cooked.

One-inch core; oven broiling

FORM III

SLAUGHTER DATA, 1961

Louisiana State

Location	LSU	LSU	LSU	LSU	LSU	LSU
Breed of sire	Brangus	Brangus	Charolais	Charolais	Charolais	Charolais
Breed of dam	BA-H	BA-B	C-BA	C-A	C-H	C-B
Line or group						
Sex	Steer	Steer	Steer	Steer	Steer	Steer
Age at Slaughter	425.0	375.5	426.0	433.0	405.5	456.0
No. slaughtered	3	2	4	3	3	1
Days in feedlot	168	168	168	168	168	168
Final feedlot wt.	846.7	675.0	851.8	886.5	856.0	955.0
Slaughter wt., live	846.7	675.0	851.8	886.5	856.0	955.0
Carcass wt., cold	498.0	399.5	523.8	545.0	498.5	564.0
Dressing percent, cold	58.79	59.18	61.43	61.44	58.22	59.06
Carcass grade, quality	9.00	7.00	5.75	8.00	6.50	4.00
Carcass grade, cutability						
Estimated percent, kidney fat	3.38	2.55	1.61	2.22	2.19	1.02
Ribeye area/100 lbs. carcass	1.84	2.11	2.15	1.90	2.00	2.11
Marbling score	3.3	1.0	1.2	2.0	1.0	1.0
Fat thickness* over ribeye	1.83	1.24	0.62	1.02	0.74	0.47
W-B shear force** pounds	16.76	20.12	16.57	18.30	16.50	15.62

* Use one measure - if not, indicate method.

** Indicate size of core used and how meat was cooked.

One-inch core; oven broiling

FORM III

SLAUGHTER DATA, 1961

Louisiana State

Location	LSU	LSU	LSU	LSU	LSU	LSU
Breed of sire	Hereford	Hereford	Hereford	Hereford	Shorthorn	Shorthorn
Breed of dam	H-BA	H-A	Hereford	H-B	S-BA	S-A
Line or group						
Sex	Steer	Steer	Steer	Steer	Steer	Steer
Age at slaughter	426.0	443.5	415.0	424.5	413.7	438.8
No. slaughtered	4	2	2	6	3	4
Days in feedlot	168	168	168	168	168	168
Final feedlot wt.	753.8	810.0	696.0	851.8	733.3	684.5
Slaughter wt., live	753.8	810.0	696.0	851.8	733.3	684.5
Carcass wt., cold	448.5	482.0	400.5	512.7	437.0	409.8
Dressing percent, cold	59.47	59.50	57.54	60.10	59.48	59.85
Carcass grade, quality	8.50	8.50	8.00	8.17	9.00	8.25
Carcass grade, cutability						
Estimated percent, kidney fat	2.20	1.70	2.10	1.93	3.11	2.56
Ribeye area/100 lbs. carcass	1.93	1.77	2.09	1.53	1.77	1.91
Marbling score	2.0	1.5	2.0	2.0	2.3	2.2
Fat thickness* over ribeye	1.13	1.00	0.88	1.39	1.10	1.18
W-B shear force** pounds	18.38	18.72	16.92	16.44	18.79	17.90

* Use one measure - if not, indicate method.

** Indicate size of core used and how meat was cooked.
One inch core; oven broiling

FORM III

SLAUGHTER DATA, 1961

Louisiana State

Location	LSU	LSU				
Breed of sire	Shorthorn	Shorthorn				
Breed of dam	S-H	S-B				
Line or group						
Sex	Steer	Steer				
Age at Slaughter	442.6	442.3				
No. slaughtered	5	3				
Days in feedlot	168	168				
Final feedlot wt.	763.4	829.3				
Slaughter wt., live	763.4	829.3				
Carcass wt., cold	446.4	518.7				
Dressing percent, cold	58.47	62.54				
Carcass grade, quality	8.40	8.67				
Carcass grade, cutability						
Estimated percent, kidney fat	3.24	3.85				
Ribeye area/100 lbs. carcass	1.74	1.46				
Marbling score	2.2	2.3				
Fat thickness* over ribeye	1.51	1.74				
W-B shear force** pounds	17.22	19.82				

* Use one measure - if not, indicate method.

** Indicate size of core used and how meat was cooked.

One inch core; oven broiling.

Iberia Livestock Experiment Station
Jeanerette, Louisiana

I. PROJECT: AHRD Line Project dl-6 (S-10)

Development of Pure and Crossbred Types of Beef Cattle for the Southeastern United States and the Gulf Coast Region.

II. OBJECTIVES:

To evaluate the performance of strains of Brangus and Africander-Angus with Angus and Brahman.

To assess the progress made with crossbred lines of Brangus by comparing them to first crosses of the two parent breeds.

To explore the use and value of Sindhi (Zebu dairy type) cattle by crossing the cows with Angus and Brahman bulls and by mating Sindhi bulls to random samples of Brangus and Africander-Angus cows.

To study and evaluate carcass merit and quality of the steers and heifers from the various crossbred lines, purebreds and other crosses.

To evaluate the combining ability of Angus, Brahman and Sindhi bulls when bred to random samples of Brangus and Africander-Angus cows by studying the growth and carcass merit of the progeny.

To study fertility among the several breed groups under normal management procedures on the station.

III. PERSONNEL:

Iberia Livestock Experiment Station:
T. M. DeRouen, Assistant Professor; W. L. Reynolds, Animal Husbandman; S. L. Cathcart, Superintendent, (retired July 31, 1961); Joe W. High, Jr., Superintendent.
University of Tennessee, Knoxville, Tennessee:
C. M. Kincaid, Regional Coordinator, S-10
Louisiana State University:
R. S. Temple, Associate Professor; A. M. Mullins, Associate Professor; R. M. Boulware, Associate Professor; Noah England, Assistant Professor.

IV. ACCOMPLISHMENTS DURING THE YEAR:

1. Calving and weaning information:

There were fourteen single sire herds consisting of a total of 277 cows. The bulls were put in their respective breeding herds on pasture

April 1, and they were removed on June 15. The breeding season lasted 75 days. All cows exposed to bulls during the breeding season were palpated for pregnancy during September 1960. Seventy-four percent of the cows were diagnosed as pregnant.

Calving began early in January and continued until the latter part of March. Calving losses were high during the first hours following parturition, especially among the Brahman and Sindhi cows.

All calves were weaned on September 11, 1961. The F_1 calves gained slightly faster than the calves of the Brangus and the Africander-Angus lines, while the purebred calves made the least gains per day.

A summary of calving information is given on Form I.

2. Post-weaning performance:

a. Bulls - Selection of bull calves to be placed on gain evaluation test was made in the fall at weaning. The calves were fed ad lib in individual pens. Brangus bulls out-gained all other calves on test, while the Brahman bulls gained least. The Brangus bulls required 7.35 pounds of feed per pound of gain, and Angus bulls 7.78, the Brahman bulls 7.85 and the Africander-Angus bulls 8.61 pounds.

b. Combining ability heifers - It appears from the first year's results that the Angus and the Brahman bulls combine well with the Brangus and the Africander-Angus cows as far as growth rate of the heifers is concerned.

The Angus bulls seem to combine better with the Brangus and the Africander-Angus cows than the Brahman bulls in improving the conformation or type score of the heifer progeny.

Preliminary results indicate that where Sindhi blood, either from the sire or the dam, is used the growth rate and the type score of the heifers are lowered.

c. Combining ability steers - Steers sired by Angus bulls out of Brangus, Africander-Angus and Sindhi cows gained faster on feed and had a higher type score at the end of the test than steers sired by Brahman bulls out of similar cows. Sindhi bulls sired steers that gained slower than those sired by Angus or by Brahman bulls out of the same kind of cows.

The type score of the Sindhi sired steers were similar to the Brahman sired steers but lower than those sired by Angus bulls out of similar cows.

Preliminary data indicate that steers by Angus bulls out of Sindhi cows gained more rapidly than similar steers sired by Brahman bulls. Only three animals were involved.

A summary of post-weaning performance of bulls, steers and heifers is presented on Form II.

3. Carcass Data:

a. Combining ability heifers - The first year of slaughter data on the combining ability heifers indicate that those sired by Angus bulls out of Brangus, Africander-Angus or Sindhi cows had heavier carcasses, attained a higher carcass grade and the lean was more tender than similar heifers sired by Brahman or Sindhi bulls.

The heifers sired by Brahman bulls out of Brangus, Africander-Angus or Sindhi cows had a higher dressing percent, were similar in rib-eye area and had less fat thickness over the rib-eye than similar heifers sired by Angus bulls.

Heifers sired by Sindhi bulls out of Brangus or Africander-Angus cows had similar carcass characteristics to those sired by Brahman bulls. However, the Sindhi-sired heifers produced smaller carcasses and the lean was more tender than the Brahman-sired heifers.

b. Combining ability steers - Preliminary data on the combining ability steers showed that the steers sired by Angus bulls out of Brangus or Africander-Angus cows had a higher carcass grade, larger rib-eye area and the lean was more tender than the same kind of steers sired by Brahman or Sindhi bulls.

The combining ability steers sired by Brahman bulls out of Brangus or Africander-Angus cows produced heavier carcasses, had a higher dressing percent and had less fat thickness over the rib-eye area than similar steers sired by Angus or Sindhi bulls.

This year's test produced only one crossbred Brahman-Sindhi steer and four crossbred steers of Angus-Sindhi breeding. No preliminary results are given.

c. Straight and crossbred steers - In the study of the straight and crossbred steers (i.e., Angus, Brahman, Brangus, Africander-Angus and F_1 crossbred), the F_1 steers produced the heaviest carcasses. They were followed in carcass weight by the Angus, Brangus, Africander-Angus and Brahman. The F_1 crossbred steers attained the highest dressing percent. The Brahmans were second, the Angus third and the Brangus and Africander-Angus were similar and last.

The carcass grade of the Brahman steers was considerably lower than that of the other steers. The F_1 crossbred carcass grades were lower than usual in this year's test. The Angus steers had the highest carcass grade, Brangus were second, and the Africander-Angus were third.

In rib-eye area, the F_1 crossbred steers ranked first, the Africander-Angus were a close second, and they were followed by the Brangus steers. The Angus and the Brahman had the smallest rib-eye area.

The Africander-Angus steers had the most tender lean. They were followed by the F_1 crossbreds and the Angus, which were similar. The Brangus were next in tenderness and the Brahmans were the least tender.

Carcass information on steers and heifers is presented on Form III.

4. Yearling Replacement Heifers:

Information on the growth rate of the yearling replacement heifers maintained under the same conditions indicated that the first cross Angus-Brahman and the Angus heifers gained approximately the same. They

were followed in gain per day by the Brangus, Brahman and Africander-Angus. The type score of the Angus heifers was much higher than that of the other heifers. The F_1 crossbred and the Brangus heifers were similar in their conformation score. They were followed in type score, respectively, by the Brahman and the Africander-Angus.

5. Post-Weaning Breeding Performance of Open Cows:

An experiment was conducted to investigate the fertility of cows and two-year-old heifers which failed to become pregnant in the regular breeding season.

A group of open cows were placed with a fertile bull in September for an 18 day period. Only twenty percent of the cows showing heat settled to this service. After the calves were weaned, fifty percent of the cows showing heat conceived within eighteen days. Within a forty-two day period after weaning calves, 61.5 percent of the cows showing heat settled. This is lower than the pregnancy rate of the cows showing heat for the preceeding year - 73.3 percent. Only sixty-seven percent of the two-year-old heifers which showed heat settled within the forty-two day period.

6. Age of Puberty of Heifers:

Observations of the age of puberty were made on Brangus, Angus, Brahman, Angus-Brahman F_1, Brahman-Angus F_1 and Africander-Angus replacement heifers during 1961. Angus heifers reached puberty sooner than the other breeds while the Brahman heifers were slowest in reaching sexual maturity.

All of the Angus, Angus-Brahman F_1, Brahman-Angus F_1, eighty-six percent of the Brangus, sixty-seven percent of the Africander-Angus had reached puberty by eighteen months of age. Only twenty-five percent of the Brahman heifers had shown heat at this age.

7. Milk Production of Cows in the Breeding Herd:

Milk production of the cows was measured in May and again in June. The calves were approximately four months of age. They were weighed, allowed to nurse and weighed again. The difference in the weights represented the milk production for a sixteen hour period.

Some Zebu and Zebu-cross calves failed to nurse and were excluded from the study.

Sindhi and Brangus cows were highest in milk production. The Angus and the Africander-Angus cows were intermediate and the Brahman cows were lowest in milk yield. There was little difference in the milk production of dams nursing straightbred and those nursing cross-bred calves.

Cows that were five years of age and older consistently gave more milk than three or four year old cows.

COW PRODUCTION, 1961 CALF CROP

Louisiana, Jeanerette State

Location	Jeanerette	Jeanerette	Jeanerette	Jeanerette	Jeanerette	Jeanerette
Breed of sire	Brangus	~~Africander~~ Angus	Angus	Brahman	Angus	Angus
Breed of dam	Brangus	~~Africander~~ Angus	Angus	Brahman	Brangus	Africander-Angus
Line or group[1]	Brangus	~~Africander~~ Angus	Purebred	Purebred	Combining Ability	Combining Ability
No. cows exposed[2]	79	18	26	24	15	18
No. calves born[3]	53	16	20	17	10	16
Calving percent, born	67	89	77	71	67	89
Ave. birth date	2/8/61	2/6/61	1/26/61	3/9/61	1/31/61	2/2/61
Ave. birth wt.	65	66	58	63	62	63
Number calves weaned	45	14	19	13	10	16
Calving percent, weaned[4]	57	78	73	54	67	89
Ave. weaning age, days	215	217	228	185	223	221
Adj. A.D.G.[5]	1.68	1.62	1.43	1.48	1.69	1.63
Ave. type score[6]	8.6	8.4	10.5	6.9	9.6	10.0
Ave. condition score[6]	8.5	7.8	8.6	6.5	9.2	9.1

- Purebreds, grade, line, backcross, 3-breed crosses, treatment, etc.
2 - Total number put in breeding herd.
3 - Total number born, dead + alive.
4 - Number weaned divided by number of cows exposed.
5 - Indicate adjustments. Age of dam: x
Age of Calf: x
Adjusted to steer basis
6 - 15, 16 and 17 = Fancy
12, 13 and 14 = Choice
9, 10 and 11 = Good
6, 7 and 8 = Medium

FORM I

130
La., Jen. (7)

COW PRODUCTION, 1961 CALF CROP

Jeanerette, Louisiana State

Location	Jeanerette	Jeanerette	Jeanerette	Jeanerette	Jeanerette	Jeanerette
Breed of sire	Angus	Angus	Brahman	Brahman	Brahman	Brahman
Breed of dam	Sindhi	Brahman	Angus	Brangus	Africander Angus	Sindhi
Line or group[1]	Crossbred	F1	F1	Combining Ability	Combining Ability	Crossbred
No. cows exposed[2]	12	15	16	11	12	8
No. calves born[3]	7	13	13	5	6	5
Calving percent, born	58	87	87	45	50	63
Ave. birth date	1/30/61	2/15/61	2/24/61	3/1/61	3/11/61	2/16/61
Ave. birth wt.	53	57	74	69.6	81	48
Number calves weaned	7	12	13	5	5	2
Calving percent, weaned[4]	58	80	87	45	42	25
Ave. weaning age, days	224	208	199	194	184	207
Adj. A.D.G.[5]	1.76	1.77	1.72	1.70	1.69	1.73
Ave. type score[6]	9.7	8.7	8.6	6.6	7.2	9.0
Ave. condition score[6]	9.9	9.0	8.9	7.4	7.6	10.5

1 - Purebreds, grade, line, backcross, 3-breed crosses, treatment, etc.
2 - Total number put in breeding herd.
3 - Total number born, dead + alive.
4 - Number weaned divided by number of cows exposed.
5 - Indicate adjustments. Age of dam: x
Sex of calf: x
Adjusted to steer basis
6 - 15, 16 and 17 = Fancy
12, 13 and 14 = Choice
9, 10 and 11 = Good
6, 7 and 8 = Medium

FORM I

131
La., Jen.(8)

COW PRODUCTION, 1961 CALF CROP
Jeanerette, Louisiana State

Location	Jeanerette	Jeanerette				
Breed of sire	Sindhi	Sindhi				
Breed of dam	Africander Angus	Brangus				
Line or group[1]	Combining Ability	Combining Ability				
No. cows exposed[2]	12	12				
No. calves born[3]	8	6				
Calving percent, born	67	50				
Ave. birth date	2/15/61	2/11/61				
Ave. birth wt.	64	66				
Number calves weaned	7	6				
Calving percent, weaned[4]	58	50				
Ave. weaning age, days	208	212				
Adj. A.D.G.[5]	1.46	1.62				
Ave. type score[6]	7.9	8.5				
Ave. condition score[6]	9.0	9.2				

1 - Purebreds, grade, line, backcross, 3-breed crosses, treatment, etc.
2 - Total number put in breeding herd.
3 - Total number born, dead + alive.
4 - Number weaned divided by number of cows exposed.
5 - Indicate adjustments. Age of dam: x
Sex of calf: x
Adjusted to steer basis
6 - 15,16 and 17 = Fancy
12, 13 and 14 = Choice
9, 10 and 11 = Good
6, 7 and 8 = Medium

FORM II

POSTWEANING PERFORMANCE OF CALVES FED IN 1961

Jeanerette, Louisiana State

	Location	Jeanerette					
	Breed of sire	Brangus	Afr.-Ang.	Angus	Brahman	Angus	Brahman
	Breed of dam	Brangus	Afr.-Ang.	Angus	Brahman	Brangus	Brangus
	Line or group*	Brangus	Afr.-Ang.	Angus	Brahman	Comb.-Ab.	Comb.-Ab.
Bulls	No. in group	8	2	7	3		
	Feed regime**						
	Ave. init. age	251	235	259	214		
	Ave. init. wt.	532	440	437	408		
	Ave.no.da.fed	140	140	140	140		
	Ave. final wt.	907	788	781	697		
	ADG on test	2.68	2.49	2.46	2.06		
	Ave. type sc.	10.2	8.2	10.2	9.2		
	Ave. cond, sc.						
	Ave. inbreeding	8.77	11.04	none	none		
Heifers	No. in group					3	2
	Feed regime**						
	Ave. init. age					245	252
	Ave. init. wt.					403	410
	Ave.no.da.fed					168	168
	Ave. final wt.					722	698
	ADG on test					1.89	1.71
	Ave. type sc.					9.3	7.0
	Ave. cond. sc.						
	Ave. inbreeding					none	none
Steers	No. in group	15	5	6	4	8	2
	Feed regime**						
	Ave. init. age	245	247	247	244	256	251
	Ave. init. wt.	412	406	399	404	488	530
	Ave.no.da.fed	196	196	196	196	196	196
	Ave. final wt.	799	785	830	694	879	908
	ADG on test	1.97	1.93	2.20	1.48	1.99	1.92
	Ave. type sc.	8.5	7.8	10.0	8.2	10.0	8.1
	Ave. cond. sc.						
	Ave. inbreeding	7.70	8.76	none	none	none	none

* Show whether station-owned or cooperator-owned, in addition to other group designation

**

	Bulls	Steers	Heifers
How fed - full, limited, etc.	Full-fed, individ.	Full-fed, group	Full-fed, group
Pounds/day over feeding period	19.0	24.6	18.6

Ration:

Bulls, heifers and steers all fed same ration:

No. 2 yellow corn	625 lbs.
Cottonseed meal	125 lbs.
42% grade alfalfa hay	250 lbs.
	1000 lbs.

Salt and bonemeal - free choice

POSTWEANING PERFORMANCE OF CALVES FED IN 1961

Jeanerette, Louisiana State

	Location	Jeanerette					
	Breed of sire	Sindhi	Angus	Brahman	Sindhi	Brahman	Angus
	Breed of dam	Brangus	Afr.-Ang.	Afr.-Ang.	Afr.-Ang.	Sindhi	Sindhi
	Line or group*	Comb.-Ab.	Comb.-Ab.	Comb.-Ab.	Comb.-Ab.	Comb.-Ab.	Comb.-Ab.
Bulls	No. in group						
	Feed regime**						
	Ave. init. age						
	Ave. init. wt.						
	Ave.no.da.fed						
	Ave. final wt.						
	ADG on test						
	Ave. type sc.						
	Ave. cond, sc.						
	Ave. inbreeding						
Heifers	No. in group	5	8	4	7	4	2
	Feed regime**						
	Ave. init. age	250	251	242	237	243	253
	Ave. init. wt.	404	372	472	356	330	368
	Ave.no.da.fed	168	168	168	168	168	168
	Ave. final wt.	664	730	830	620	572	670
	ADG on test	1.55	2.13	2.13	1.57	1.44	1.80
	Ave. type sc.	7.9	9.3	8.4	7.7	7.7	8.2
	Ave. cond. sc.						
	Ave. inbreeding	none	none	none	none	none	none
Steers	No. in group	6	4	5	2	1	2
	Feed regime**						
	Ave. init. age	251	248	260	237	245	238
	Ave. init. wt.	425	456	484	388	355	390
	Ave.no.da.fed	196	196	196	196	196	196
	Ave. final wt.	713	860	857	702	625	745
	ADG on test	1.47	2.06	1.90	1.61	1.38	1.81
	Ave. type sc.	8.2	8.8	8.6	8.3	8.3	8.3
	Ave. cond. sc.						
	Ave. inbreeding	none	none	none	none	none	none

* Sho. whether station-owned or cooperator-owned, in addition to other group designation

**

	Bulls	Steers	Heifers
How fed - full, limited, etc.		Full-fed, group	Full-fed, group
Pounds/day over feeding period		24.6	18.6

Ration:
Steers and heifers fed same ration:

No. 2 yellow corn	625 lbs.
Cottonseed meal	125 lbs.
42% grade alfalfa hay	250 lbs.
	1000 lbs.

Salt and bonemeal - free choice

POSTWEANING PERFORMANCE OF CALVES FED IN 1961

Jeanerette, Louisiana State

Location		Jeanerette					
Breed of sire		Brahman					
Breed of dam		Angus					
Line or group*		F_1					
Bulls	No. in group						
	Feed regime**						
	Ave. init. age						
	Ave. init. wt.						
	Ave.no.da.fed						
	Ave. final wt.						
	ADG on test						
	Ave. type sc.						
	Ave. cond, sc.						
	Ave. inbreeding						
Heifers	No. in group						
	Feed regime**						
	Ave. init. age						
	Ave. init. wt.						
	Ave.no.da.fed						
	Ave. final wt.						
	ADG on test						
	Ave. type sc.						
	Ave. cond. sc.						
	Ave. inbreeding						
Steers	No. in group	5					
	Feed regime**						
	Ave. init. age	254					
	Ave. init. wt.	449					
	Ave.no.da.fed	196					
	Ave. final wt.	838					
	ADG on test	1.98					
	Ave. type sc.	8.9					
	Ave. cond. sc.						
	Ave. inbreeding	none					

* Show whether station-owned or cooperator-owned, in addition to other group designation

**

	Bulls	Steers	Heifers
How fed - full, limited, etc.		Full-fed, group	
Pounds/day over feeding period		24.6	
Ration:		No. 2 yellow corn = 625 lbs. Cottonseed meal = 125 lbs. 42% grade alfalfa hay = 250 lbs. 1000 lbs. Salt and bonemeal - free choice	

FORM III

SLAUGHTER DATA, 1961

Jeanerette, Louisiana State

Location	Jeanerette	Jeanerette	Jeanerette	Jeanerette	Jeanerette	Jeanerette
Breed of sire	Brangus	Angus	Brahman	Sindhi	Afri.-Ang.	Angus
Breed of dam	Brangus	Brangus	Brangus	Brangus	Afri.-Ang.	Afri.-Ang.
Line or group	Brangus	Combining Ability	Combining Ability	Combining Ability	Afri.-Ang.	Combining Ability
Sex	Steer	Steer	Steer	Steer	Steer	Steer
Age at slaughter	414	425	420	420	416	416
No. slaughtered	15	8	2	6	5	4
Days in feedlot	196	196	196	196	196	196
Final feedlot wt.	799	879	908	713	785	860
Slaughter wt.,live	786	859	877	704	772	840
Carcass wt., cold	462	519	528	427	451	507
Dressing percent, cold	58.65	60.41	60.20	60.65	58.41	60.35
Carcass grade, (a) quality	9.0	10.7	8.5	8.5	8.8	9.5
Carcass grade, cutability						
Estimated percent, kidney fat	.0496	.0550	.060	.038	.048	.049
Ribeye area/100 lbs. carcass	1.97	1.96	1.72	2.18	2.06	2.00
Marbling score (b)	8.7	10.7	9.0	8.2	9.2	8.8
Fat thickness over ribeye*	.51	.64	.61	.62	.49	.68
W-B shear force, pounds**	18.36	18.45	18.04	22.19	14.58	16.04

* Use one measure - if not, indicate method

** Indicate size of core used and how meat was cooked.

One-inch core; oven cooked

(a) Estimated by Federal grader.
(b) USDA degrees of marbling chart.

La., Jen. (13)

FORM III

SLAUGHTER DATA, 1961

Jeanerette, Louisiana State

Location	Jeanerette	Jeanerette	Jeanerette	Jeanerette	Jeanerette	Jeanerett
Breed of sire	Brahman	Sindhi	Angus	Brahman	Brahman	Angus
Breed of dam	Afri.-Ang.	Afri.-Ang.	Angus	Angus	Brahman	Sindhi
Line or group	Combining Ability	Combining Ability	Purebred	Crossbred	Purebred	Crossbre
Sex	Steers	Steers	Steers	Steers	Steers	Steers
Age at slaughter	429	407	418	423	413	407
No. slaughtered	5	2	6	5	4	2
Days in feedlot	196	196	196	196	196	196
Final feedlot wt.	857	702	830	838	694	745
Slaughter wt.,live	838	685	820	830	676	735
Carcass wt., cold	519	411	485	510	406	441
Dressing percent, cold	61.93	60.00	59.14	61.44	60.05	60.00
Carcass grade, quality (a)	9.4	9.0	9.8	8.0	6.2	9.5
Carcass grade, cutability						
Estimated percent, kidney fat	.054	.060	.048	.052	.031	.055
Ribeye area/100 lbs. carcass	1.82	1.87	1.82	1.86	2.09	2.26
Marbling score (b)	9.4	8.5	9.2	9.0	5.5	9.5
Fat thickness over ribeye*	.56	.56	.65	.54	.42	.50
W-B shear force, pounds**	17.98	19.75	15.97	15.89	20.75	15.47

* Use one measure - if not, indicate method

** Indicate size of core used and how meat was cooked.

One-inch core; oven cooked

(a) Estimated by Federal grader.

(b) USDA degrees of marbling chart values.

FORM III

SLAUGHTER DATA, 1961

Jeanerette, Louisiana State

Location	Jeanerette	Jeanerette	Jeanerette	Jeanerette	Jeanerette	Jeanerette
Breed of sire	Angus	Brahman	Sindhi	Angus	Brahman	Sindhi
Breed of dam	Brahman-Angus Combining	Brahman-Angus Combining	Brahman-Angus Combining	Afri.-Angus Combining	Afri.-Angus Combining	Afri.-Angus Combining
Line or group	Ability	Ability	Ability	Ability	Ability	Ability
Sex	Heifers	Heifers	Heifers	Heifers	Heifers	Heifers
Age at slaughter	416	423	421	422	412	408
No. slaughtered	3	2	5	8	4	7
Days in feedlot	168	168	168	168	168	168
Final feedlot wt.	722	698	664	730	774	620
Slaughter wt.,live	702	670	639	702	744	588
Carcass wt., cold	419	412	381	415	451	356
Dressing percent, cold	59.68	61.49	59.62	59.10	60.61	60.54
Carcass grade, quality (a)	11.0	9.0	9.4	10.5	9.5	9.3
Carcass grade, cutability						
Estimated percent, kidney fat						
Ribeye area/100 lbs. carcass	1.94	2.28	2.28	2.03	1.88	2.27
Marbling score						
Fat thickness over ribeye*	.88	.60	.69	.71	.66	.68
W-B shear force, pounds**	14.37	15.42	16.90	17.17	17.24	16.16

* Use one measure - if not, indicate method

** Indicate size of core used and how meat was cooked.

One-inch core; oven cooked.

(a) Estimated by Federal grader.

La., Jen. (15)

FORM III

SLAUGHTER DATA,1961

Jeanerette, Louisiana State

Location	Jeanerette	Jeanerette	Jeanerette			
Breed of sire	Brahman	Angus	Brahman			
Breed of dam	Sindhi	Sindhi	Sindhi			
Line or group	Combining Ability	Combining Ability	Combining Ability			
Sex	Heifers	Heifers	Steers			
Age at slaughter	414	424	414			
No. slaughtered	4	2	1			
Days in feedlot	168	168	196			
Final feedlot wt.	572	670	625			
Slaughter wt.,live	544	648	600			
Carcass wt., cold	324	391	327			
Dressing percent, cold	59.55	60.33	54.50			
Carcass grade, (a) quality	9.0	10.0	9.1			
Carcass grade, cutability						
Estimated percent, kidney fat			.020			
Ribeye area/100 lbs. carcass	2.24	2.31	1.78			
Marbling score(b)			8.8			
Fat thickness over ribeye*	.63	.71	.41			
W-B shear force, pounds**	19.60	13.33	23.21			

* Use one measure - if not, indicate method

** Indicate size of core used and how meat was cooked.

One-inch core; oven cooked

(a) Estimated by Federal grader.

(b) USDA degrees of marbling chart values.

Mississippi State University
Agricultural Experiment Station

I. PROJECT: Hatch 642 (S-10)

Lowered Fertility in the Bovine.

II. OBJECTIVES:

Make a survey of the reproductive performance of cattle in the Mississippi Experiment Station system.

1. Determine the reproductive efficiency for each herd of the system.

2. Determine what factors may be contributing to reproductive inefficiency.

To determine the nature of sterility in cows leaving the herd because of low reproductive performance.

Propose and test possible treatments which may increase reproductive efficiency.

III. PERSONNEL:

Bryan Baker, Jr., Animal Husbandman, Mississippi State University

IV. ACCOMPLISHMENTS DURING THE YEAR:

During this year twelve cows were used in the study and the following were observed: A. Two cows pregnant at beginning of study. B. Four cows settled on first service. C. Seven cows did not settle on the first and were slaughtered. From this latter group the following results were obtained: A. One cow had cystic follicle, but an abnormal unfertilized ovum was recovered. B. Ova were not recovered from two cows. C. Unfertilized ova were recovered from four cows. D. A normal 8-cell fertilized ovum was recovered from one cow.

V. FUTURE PLANS:

Continue the project with no revisions.

VI. PUBLICATIONS DURING THE YEAR: None

VII. PUBLICATIONS PLANNED: None

Submitted by: Bryan Baker, Jr.

I. PROJECT: 645 (not contributing to S-10)

A Study to Measure the Productivity of Large, Intermediate and Small Type Hereford Cattle.

II. OBJECTIVES:

To determine which of three types of cattle - large, medium or small - is the most suitable for beef production in Mississippi.

III. PERSONNEL:

C. E. Lindley, Animal Husbandman, Mississippi State University
E. G. Morrison, Superintendent, Brown Loam Branch Experiment Station
J. A. McGuire, Superintendent, Natchez Branch Experiment Station
Clyde Blount, Agronomist, South Mississippi Branch Experiment Station
S. P. Crockett, Superintendent, North Mississippi Branch Experiment Sta.
B. C. Hurt, Superintendent, Pontotoc Branch Experiment Station
John Campbell, Superintendent, Truck Crops Branch Experiment Station
W. R. Backus, Assistant Animal Husbandman, Mississippi State University

IV. ACCOMPLISHMENTS DURING THE YEAR:

The first complete year's data have been collected. A second calf crop has been started. Steers are slaughtered off winter grass and after a short feed following winter grass. The slaughter data on the first calf crop are presented in the following table. In addition to these data, complete production data are being taken on the different groups.

Station: BROWN LOAM

Type	Loin Area (sq. in.)	Carcass Grade	Loin Area per 100 lb. carcass wt.
Small			
Fed	8.61	10.4	1.71
Grass	6.74	8.0	1.64
Medium			
Fed	10.09	8.3	2.05
Grass	7.87	7.4	1.95
Large			
Fed	11.14	10.4	2.02
Grass	7.60	8.0	2.00

Station: SOUTH MISSISSIPPI

Type	Loin Area (sq. in.)	Carcass grade	Loin area per 100 lb. carcass wt.
Small			
Fed	10.69	11.0	2.00
Grass	8.24	7.8	2.22
Medium			
Fed	10.73	9.0	2.12
Grass	8.96	7.8	2.21
Large			
Fed	10.62	9.0	2.37
Grass	9.77	7.5	2.11

Station: TRUCK CROPS

Small			
Fed	8.30	8.6	1.96
Grass	7.47	9.0	2.04

Station: PONTOTOC

Medium			
Fed	10.76	10.5	1.72
Grass	10.38	8.5	2.17

Station: NATCHEZ

Medium			
Fed	10.64	13.0	1.66
Grass	9.08	8.2	1.93

V. FUTURE PLANS:

To continue project as outlined

VI. PUBLICATIONS DURING THE YEAR:

None

VII. PUBLICATIONS PLANNED:

None

Submitted by: C. E. Lindley

I. PROJECT: Hatch 646 (not contributing to S-10)

A Study of the Effect of Several Feeding and Management Practices on the Carcass Quality of Beef Steers Under Mississippi Conditions.

II. OBJECTIVES:

To compare feeding and management practices for the production of slaughter cattle in Mississippi.

To evaluate the quality of carcasses produced from steers under the different systems of management.

To evaluate the consumer acceptance of carcasses produced under each system of feeding and management.

III. PERSONNEL:

W. R. Backus, Assistant Animal Husbandman
J. C. Taylor, Assistant Animal Husbandman
C. E. Lindley, Animal Husbandman

IV, ACCOMPLISHMENTS DURING THE YEAR:

Seven lots of six beef steers were placed on experiment to determine the system of management and feeding which would produce the most acceptable carcasses the most efficiently. The lots were handled as follows: Lot 1 - Weanling steers - killed at weaning. Lot 2 - Weaned, winter grazed and killed. Lot 3 - Weaned, winter grazed, fed 75-90 days and killed. Lot 4 - Weaned, fed as stockers, spring and summer grazed, winter grazed and killed. Lot 5 - Weaned, fed as stockers, spring grazed, fed in drylot and killed. Lot 6 - Weaned, fed as stockers, spring grazed, fed on pasture and killed. Lot 7 - Weaned, fed as stockers, spring and summer grazed, winter grazed, fed in drylot and killed. Lots 8-14 - Replicates of Lots 1 through 7.

Lot	Sl. Weight	Car.* Grade	Marb.** Score	Percent Lean in 9-10-11 R. Sect.	Pounds of lean in 9-10-11 Rib Sect.	Fat Thickness at the 12th Rib	Ribeye Area
1	436.8	7.2	11.0	51.28	1.53	.35	6.07
2	746.2	8.4	8.6	51.73	3.24	.45	10.81
3	774.7	10.2	7.3	46.45	4.10	.75	11.97
4	1077.8	11.2	6.8	45.20	4.33	.99	11.14
5	948.7	10.5	8.5	49.41	4.21	.58	11.39
6	953.2	10.5	8.3	47.77	4.14	.60	10.80
7	1200.7	10.0	6.7	42.10	4.86	1.03	11.86

*17 = High Prime
10 = Average Good
6 = Low Standard

**1 = Extremely Abundant
5 = Slightly Abundant
9 = Slight Amount
12 = Devoid

V. FUTURE PLANS:

Continue project with slight modifications. Six lots of six steers each are on test at the present time.

VI. PUBLICATIONS DURING THE YEAR:

None

VII. PUBLICATIONS PLANNED:

None

Submitted by: W. R. Backus

* * * * *** * * * *

I. PROJECT: Hatch 666 (S-10)

A Study to Determine the Breeding worth of Inbred and Outbred Bulls from Various Sources

II. OBJECTIVES:

To compare pre- and post-weaning growth rates, market grades, carcass qualities, carcass grades and maternal ability of the progenies of potentially superior sires selected from various sources.

III. PERSONNEL:

J. C. Taylor, Assistant Animal Husbandman, Mississippi State University
L. F. Bowlin, Superintendent, Prairie Experiment Station
C. E. Lindley, Animal Husbandman, Mississippi State University

IV. ACCOMPLISHMENTS DURING THE YEAR:

Weights and grades were collected at weaning on 140 Hereford calves from six bull units, 71 Angus calves from three bull units and 41 Shorthorn calves from two bull units. Average daily gains from birth to weaning, adjusted for sex and age of dam, and grades were as follows

for each Hereford unit: Georgia Poll 692 - 1.88 and 10.5; New Mexico 8 - 1.78 and 10.6; Montana 481 - 1.75 and 9.8; Oklahoma 683 - 1.81 and 11.0; Poplarville 116 (control) 1.75 and 10.5; Rankin 839 - 1.82 and 11.0. Gains and grades respectively for the Angus and Shorthorn units were: Oklahoma 066 - 1.71 and 10.9; Equen E747 - 1.73 and 10.7; Catrack 7W6 - 1.75 and 11.2; Virginia Shorthorn 1339 - 1.70 and 11.1; Goodnews Shorthorn 56-66 - 1.72 and 11.3.

The fifty-six tester steers from the 1960 calf crop were started on oat-ryegrass pasture November 3, 1960, and taken off grazing and fed dry feed from December 19 to March 10, 1961. The steers received grain on grass until they were moved to permanent pasture May 18. The ration fed was 70 percent corn. The steers were slaughtered September 14, 1961. Average daily gains ranged, for the Hereford, from 1.34 to 1.86; for the Angus 1.55 to 1.67; for the Shorthorn 1.64 to 1.70. The overall average daily gain for all steers was 1.62. The steers averaged 913 pounds at slaughter and graded average-good in the carcass.

V. FUTURE PLANS:

The testing of various lines and the collection of data on their progeny will be continued.

VI. PUBLICATIONS DURING THE YEAR:

Hagan, Fay. A Study of Economically Important Preweaning Traits in Beef Cattle. Master's Thesis. Mississippi State University. 1962.

VII. PUBLICATIONS PLANNED:

None

Submitted by: J. C. Taylor

A STUDY OF ECONOMICALLY IMPORTANT PREWEANING TRAITS IN BEEF CATTLE

Fay Hagan, C. E. Lindley, C. J. Christians and J. C. Taylor

The increasing interest in more scientific animal breeding and the progress which may be accomplished by the individual breeder employing more scientific methods make the estimation of the heritability of economically important characteristics a valuable and necessary undertaking. Heritability is concerned with whether the differences observed between individuals arose because they started life with different genotypes or because they were exposed to different environments. The purpose of this study was to obtain heritability estimates for birth weight, weaning grade, average daily gain and weaning weight. The data used were taken from 1955 through 1961 and included information on 1448 calves from 29 Angus, 39 Hereford and 16 Shorthorn sire groups. These cattle were maintained by the Mississippi Agricultural Experiment Station and located at Prairie, Mississippi. They have been involved in a study to determine the breeding worth of inbred and outbred bulls from various sources. Since 1954 this study has been a part of the cooperative research with the Southern Agricultural Experiment Stations, Regional Project S-10 and the United States Department of Agriculture, Agricultural Research Service.

There were 350 cows which made up six breeding units of Herefords, four breeding units of Angus and two breeding units of Shorthorns. Each year the units were made up by grouping the cows within each breed on the basis of age and sire and assigning them at random to the various test bulls. Bulls were placed with the units on May 1 each year and removed August 1 to provide a 90-day breeding season.

At birth each calf included in this study was identified with its dam and the weight and sex of the calf was recorded. The calves ran with their dams through the grazing season and were not creep fed. The calves were weaned about the middle of October each year and at that time weights and grades were recorded. The grades were coded by assigning the value of ten to "middle good" and adding or subtracting one for each one-third of a grade above or below this grade.

An intra-year pooled analysis of variance of each trait was used to calculate the variance due to sires. Half-sib correlations were determined as a ratio of the variance due to sires to the total variance. Heritability estimates were obtained by multiplying the half-sib correlation by four.

Environmental factors which influence birth weight, weaning grade, average daily gain and weaning weight were considered in this study. The most important factor in this study was the influence of the sex of the calf. Males were found to be 4.3 pounds heavier at birth than females. Differences in weaning grade were small; however, steers graded .02 higher than heifers. Steer calves were found to gain .07 pounds more per day and weighed 22 pounds more at weaning than heifer calves. The differences observed due to sex were statistically significant at the (.01) level of probability for birth weight, average

daily gain and weaning weight, but not for grade at weaning. The traits which were significantly influenced by sex were adjusted using a multiplicative correction factor which was computed using a ratio of the sex means for each trait within each breed.

Birth weights, weaning grades, average daily gains and weaning weights were not adjusted for the effect of age of dam. Adjustments were not made because dams from each age group were assigned to sire groups in as nearly a random manner as possible. Each year every bull was mated to cows representing every age group in equal numbers. The assignment of sire groups in this manner tended to offset the age of dam effect when sires compared.

The heritability estimate obtained for birth weight was .38 for the Angus, .29 for Hereford and .09 for Shorthorn. The heritability of weaning grade in Angus calves was .37; in Hereford calves it was .17 and .09 in Shorthorn calves. Heritability of average daily gain from birth to weaning was .10 for Angus, .23 for Hereford and .12 for Shorthorn. Heritability estimates of weaning weight were .17 for Angus, .45 for Hereford and .15 for Shorthorn.

FORM I

147

Miss. (9)

COW PRODUCTION, 1961 CALF CROP

	Mississippi					State
Location	Prairie	Prairie	Prairie	Prairie	Prairie	Prairie
Breed of sire	Angus	P.Hereford	Hereford	Angus	Angus	Angus
Breed of dam	Hereford	Hereford	Hereford	Angus	Angus	Angus
Line or group[1]	Catrack 7W6	Georgia Poll 692	New Mexico 8	Okla 066	Lyon S053	Equen 747
No. cows exposed[2]	30	30	29	29	28	28
No. calves born[3]	27	27	27	29	5	25
Calving percent, born	90	90	93	100	18	89
Av. birth date	3/17/61	3/17/61	3/7/61	3/2/61	2/25/61	3/12/ 61
Av. birth weight	66.3	74.6	70.3	58.4	60.6	64.5
Number calves weaned	25	25	26	26	4	20
Calving percent, weaned[4]	83	83	90	90	14	71
Av. weaning age, days	210	200	210	215	220	205
Adj. A. D. G.[5]	1.75	1.88	1.78	1.71	1.84	1.73
Av. type score[6]	11.2	10.5	10.6	10.9	9.0	10.7
Av. condition score[6]	-	-	-	-	-	-

1 - Purebreds, grade, line, backcross, 3-breed cross, treatment, etc.
2 - Total number put in breeding herd.
3 - Total number born, dead + alive.
4 - Number weaned divided by number of cows exposed.
5 - Indicate adjustments.
6 - 15, 16 and 17 = Fancy
12, 13 and 14 = Choice
9, 10 and 11 = Good
6, 7 and 8 = Medium

Age of dam: x
Sex of calf: x

FORM I

COW PRODUCTION, 1961 CALF CROP

	Mississippi				State	
Location	Prairie	Prairie	Prairie	Prairie	Prairie	Prairie
Breed of sire	Hereford	Hereford	Hereford	Hereford	Shorthorn	Shorthorn
Breed of dam	Hereford	Hereford	Hereford	Hereford	Shorthorn	Shorthorn
Line or group[1]	Mont. 481	Okla 6-93	Poplar-ville 116	Rankin 839	Va 1339	Goodnews 56-66
No. cows exposed[2]	29	29	29	29	21	22
No. calves born[3]	26	28	23	26	21	21
Calving percent, born	90	97	79	90	100	95
Av. birth date	3/24/61	3/17/61	3/15/61	3/27/61	3/17/61	3/14/61
Av. birth weight	72.0	72.3	67.4	72.9	71.0	70.9
Number calves weaned	23	25	20	23	21	20
Calving percent, weaned	79	86	69	79	100	91
Av. weaning age, days	193	200	202	190	200	203
Adj. A. D. G.[5]	1.75	1.81	1.75	1.82	1.70	1.72
Av. type score[6]	9.8	11.0	10.5	11.0	11.1	11.3
Av. condition score[6]	-	-	-	-	-	-

1 - Purebreds, grade, line, backcross, 3-breed cross, treatment, etc.
2 - Total number put in breeding herd.
3 - Total number born, dead + alive.
4 - Number weaned divided by number of cows exposed.
5 - Indicate adjustments.
6 - 15, 16 and 17 = Fancy
12, 13 and 14 = Choice
9, 10 and 11 = Good
6, 7 and 8 = Medium

Age of dam: x
Sex of calf: x

POST-WEANING PERFORMANCE OF CALVES FED IN 1961

Mississippi State

Location		Prairie	Prairie	Prairie	Prairie	Prairie	Prairie
Breed of sire		Hereford	Hereford	Hereford	Hereford	Hereford	Hereford
Breed of dam		Hereford	Hereford	Hereford	Hereford	Hereford	Hereford
Line or group *		Col. 7078	Col. 7002	Calif. 371	Okla. 6-62	Pvl. 116	Mont. 481
Bulls	No. in group						
	Feed regime **						
	Av. init. age						
	Av. init. wt						
	Av. no. da. fed						
	Av. final wt.						
	ADG on test						
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						
Heifers	No. in group						
	Feed regime **						
	Av. init. age						
	Av. init. wt.						
	Av. no. da. fed						
	Av. final wt.						
	ADG on test						
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						
Steers	No. in group	5	5	5	5	4	5
	Feed regime **						
	Av. init. age	247	260	256	260	251	258
	Av. init. wt.	451	402	447	457	408	453
	Av. no. da. fed	315	315	315	315	315	315
	Av. final wt.	1034	891	992	900	832	961
	ADG on test	1.86	1.55	1.73	1.54	1.34	1.62
	Av. type sc.	9.7	9.1	9.9	9.9	8.6	9.5
	Av. cond. sc.						
	Av. inbreeding						

* Show whether station-owned or cooperator-owned, in addition to other group designation.

**

	Bulls	Steers	Heifers
How fed - full, limited, etc.			
Pounds/day over feeding period			
Ration:		Winter grazed followed by a full-feed of corn fed on native pasture.	

FORM II

POSTWEANING PERFORMANCE OF CALVES FED IN 1961

Mississippi State

	Location	Prairie	Prairie	Prairie	Prairie	Prairie	Prairie
	Breed of sire	Angus	Angus	Angus	Angus	Shorthorn	Shorthorn
	Breed of dam	Angus	Angus	Angus	Angus	Shorthorn	Shorthorn
	Line or group *	Okla.436	Okla.066	Va. 917	Jxn.255	Chester	Gn. 56-66
Bulls	No. in group						
	Feed regime **						
	Av. init. age						
	Av. init. wt.						
	Av.no.da.fed						
	Av. final wt.						
	ADG on test						
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						
Heifers	No. in group						
	Feed regime **						
	Av. init. age						
	Av. init. wt.						
	Av. no.da.fed						
	Av. final wt.						
	ADG on test						
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						
Steers	No. in group	5	5	5	4	3	5
	Feed regime **						
	Av. init. age	251	251	268	243	207	220
	Av. init. wt.	483	418	435	442	412	372
	Av.no.da.fed	315	315	315	315	315	315
	Av. final wt.	1007	906	925	966	787	907
	ADG on test	1.67	1.55	1.56	1.67	1.64	1.70
	Av. type sc.	10.6	9.3	10.7	11.0	9.0	10.2
	Av. cond. sc.						
	Av. inbreeding						

* Show whether station-owned or cooperator-owned, in addition to other group designation.

**

	Bulls	Steers	Heifers
How fed - full, limited, etc.			
Pounds/day over feeding period			
Ration:		Winter grazed followed by a full-feed of corn fed on native pasture.	

FORM III

SLAUGHTER DATA, 1961

Mississippi State

Location	Prairie	Prairie	Prairie	Prairie	Prairie	Prairie
Breed of sire	Hereford	Hereford	Hereford	Hereford	Hereford	Hereford
Breed of dam	Hereford	Hereford	Hereford	Hereford	Hereford	Hereford
Line or group	Colorado 7078	Colorado 7002	California 371	Oklahoma 6-62	Poplarville 116	Montana 481
Sex	Male	Male	Male	Male	Male	Male
Age at Slaughter	562	575	571	575	566	573
No. slaughtered	5	5	5	5	4	5
Days in feedlot	315	315	315	315	315	315
Final feedlot wt.	1034	891	992	900	832	961
aughter wt., live	1034	891	992	900	832	961
Carcass wt., cold	647	550	619	559	512	598
Dressing percent, cold	62.4	61.7	62.4	62.1	61.6	62.1
Carcass grade, quality	10.2	9.2	10.0	9.4	9.3	10.2
Carcass grade, cutability						
Estimated percent, kidney fat						
Ribeye area/100 lbs. carcass	1.91	2.01	1.78	2.23	2.03	1.82
Marbling score	7.4	8.0	8.4	7.4	8.0	7.4
Fat thickness* over ribeye	.71	.55	.73	.56	.57	.76
W-B shear force** pounds						

* Use one measure - if not, indicate method.

** Indicate size of core used and how meat was cooked.

Miss. (14)

FORM III

SLAUGHTER DATA, 1961

Mississippi State

Location	Prairie	Prairie	Prairie	Prairie	Prairie	Prairie
Breed of sire	Angus	Angus	Angus	Angus	Shorthorn	Shorthorn
Breed of dam	Angus	Angus	Angus	Angus	Shorthorn	Shorthorn
Line or group	Oklahoma 436	Oklahoma 066	Virginia 917	Jackson 255	Chester	Goodnews 56-66
Sex	Male	Male	Male	Male	Male	Male
Age at Slaughter	566	566	583	558	522	535
No. slaughtered	5	5	5	4	3	5
Days in feedlot	315	315	315	315	315	315
Final feedlot wt.	1007	906	925	966	787	907
Slaughter wt., live	1007	906	925	966	787	907
Carcass wt., cold	634	568	583	602	545	563
Dressing percent, cold	63.0	62.7	63.0	62.2	62.2	62.1
Carcass grade, quality	11.2	12.0	11.6	10.6	10.3	10.8
Carcass grade, cutability						
Estimated percent, kidney fat						
Ribeye area/100 lbs. carcass	1.84	1.99	1.96	1.85	1.84	1.94
Marbling score	6.2	5.8	6.0	6.8	6.3	6.8
Fat thickness* over ribeye	.77	.80	.75	.79	.80	.83
W-B shear force** pounds						

* Use one measure - if not, indicate method.

** Indicate size of core used and how meat was cooked.

North Carolina State College
Agricultural Experiment Station

I. PROJECT: Animal Industry H-198, AHRD Line Project d1-23 (S-10)

Genetic and Environmental Interactions for Performance and Carcass Traits in Beef Cattle.

II. OBJECTIVES:

To evaluate the importance of sire-by-location interactions for performance traits.

To evaluate sire-by-location and ration interaction for gain and carcass characteristics of steer progeny.

To develop and evaluate selection criteria for the improvement of productive efficiency and market quality.

III. PERSONNEL:

E. U. Dillard, Associate Professor; J. H. Gregory, Instructor; J. E. Legates, Head, Animal Breeding Section; O. W. Robison, Assistant Professor; and J. R. Hill, Graduate Research Assistant.

IV. ACCOMPLISHMENTS DURING THE YEAR:

1961 was the second year of artificial insemination in the four beef herds participating in this project. Prior to the breeding season, personnel from each location came to Raleigh for training in artificial insemination. Thus, in 1961, there was a capable person at each station to do the inseminating. This is considered an improvement over dependence upon the local A. I. technician, and percentage conception was up in the herds. A total of 245 cows were in the herds for breeding. Only twelve were never detected in heat during the two to three month breeding season. The average number of services per calf born for all herds was 2.4, and 68.6 percent of the cows in the herds calved.

Fourteen bulls completing the post-weaning feed test were slaughtered for carcass evaluation. Three half-sib progeny of one sire group were retained for progeny testing. Thirty-seven steer progeny half brothers to two bull groups were slaughtered for the sire x location x treatment interaction gain and carcass evaluation. Significant differences in rate of gain and most carcass evaluation points were observed for treatments, but not for sire or location. Much more data will be needed to adequately appraise these differences and the interaction.

V. FUTURE PLANS:

This project will be continued essentially as it is now. This is a long-range study and reliable conclusions cannot be made until data are available for five to ten years.

VI. PUBLICATIONS DURING THE YEAR:

None

VII. PUBLICATIONS PLANNED:

None. Two Ph.D. theses are in preparation, and results are expected to be published in 1962 or 1963.

Submitted by: E. U. Dillard

COW PRODUCTION, 1961 CALF CROP

	North Carolina				State	
Location	Raleigh	Plymouth	Laurel Springs	Umsted Hospital		
Breed of sire	Hereford	Hereford	Hereford	Hereford		
Breed of dam	Hereford	Hereford	Hereford	Hereford		
Line or group[1]	Hereford	Hereford	Hereford	Hereford		
No. cows exposed[2]	76	62	51	85		
No. calves born[3]	32	31	29	73		
Calving percent, born	58	71	57	86		
Av. birth date	2/15/61	3/2/61	2/15/61	1/15/61		
Av. birth weight	58	57	65	62		
Number calves weaned	31	23	25	68		
Calving percent, weaned	41	37	49	80		
Av. weaning age, days	224	204	216	249		
Adj. A. D. G.[5]	1.36	1.36	1.86	1.59		
Av. type score[6]	10	9	10	10		
Av. condition score[6]	-	-	-	-		

1 - Purebreds, grade, line, backcross, 3-breed cross, treatment, etc.
2 - Total number put in breeding herd.
3 - Total number born, dead + alive.
4 - Number weaned divided by number of cows exposed.
5 - Indicate adjustments. Age of dam: Combined. See Va. Bulletin 489 for season 1, no creep.
Age of calf: to 205 days.
Sex of calf: see Va. bulletin 489 for season 1.
6 - 15, 16 and 17 = Fancy
12, 13 and 14 = Choice
9, 10 and 11 = Good
6, 7 and 8 = Medium

FORM II

POSTWEANING PERFORMANCE OF CALVES FED IN 1961

North Carolina State

	Location	Raleigh	Plymouth	LaurelSp.
	Breed of sire	Hereford	Hereford	Hereford
	Breed of dam	Hereford	Hereford	Hereford
	Line or group *	Hereford	Hereford	Hereford
Bulls	No. in group	18		
	Feed regime **			
	Av. init. age	268		
	Av. init. wt.	478		
	Av.no.da.fed	154		
	Av. final wt.	848		
	ADG on test	2.4		
	Av. type sc.	11		
	Av. cond. sc.			
	Av. inbreeding	1.5		
Heifers	No. in group	18	20	7
	Feed regime **			
	Av. init. age	323	254	283
	Av. init. wt.	402	372	421
	Av. no.da.fed	142	140	140
	Av. final wt.	553	508	595
	ADG on test	1.08	.97	1.24
	Av. type sc.	9.6	9.7	10.3
	Av. cond. sc.			
	Av. inbreeding	1.5	2.4	2.3
Steers	No. in group		29	9
	Feed regime **			
	Av. init. age		259	247
	Av. init. wt.		406	419
	Av.no.da.fed		140	140
	Av. final wt.		506	592
	ADG on test		.71	1.24
	Av. type sc.		9.2	10.7
	Av. cond. sc.			
	Av. inbreeding		2.5	2.1

* Show whether station-owned or cooperator-owned, in addition to other group designation.

**

	Bulls	Steers	Heifers
How fed - full, limited, etc.	Full-fed	Limited	Limited
Pounds/day over feeding period			

Ration:

Gr. sn. corn	1275	lbs.
Gr. corncobs	400	lbs.
Deh. alf. meal	100	lbs.
Soybean oil meal	200	lbs.
Defl. phosphate	12	lbs.
Gr. limestone	6	lbs.
Tr. min. salt	7	lbs.
	2000	lbs.

Heifers and steers fed corn silage and protein supplement to gain from .75 to 1.25 pounds per day.

Mixed grass-clover hay fed ad libitum.

FORM III

SLAUGHTER DATA, 1961

North Carolina State

Location	Raleigh	Laurel Springs	Plymouth	Laurel Springs	Plymouth	
Breed of sire	Hereford	Hereford	Hereford	Hereford	Hereford	
Breed of dam	Hereford	Hereford	Hereford	Hereford	Hereford	
Line or group	Hereford	Hereford	Hereford	Hereford	Hereford	
Sex	Bulls	Steers	Steers	Steers	Steers	
Age at slaughter	17.6 mo.	20.8 mo.	20 mo.	19.6 mo.	20 mo.	
No. slaughtered	14	4	15	4	14	
Days in feedlot	259	177	189	Pasture	Pasture	
Final feedlot wt.	1027	1000	931	821	704	
Slaughter wt., live	977	941	875	774	642	
Carcass wt., cold	600	578	510	442	347	
Dressing percent, cold	61.4	61.4	58.3	57.1	54.1	
Carcass grade, quality	Commercial	Choice-	Good	Good-	Standard	
Carcass grade, cutability						
Estimated percent, kidney fat						
Ribeye area/100 lbs. carcass	1.88	1.77	1.93	2.20	2.31	
Marbling score	Traces	Modest	Small	Slight	Traces	
Fat thickness over ribeye*	12.54	24.04	16.48	10.21	8.66	
W-B shear force, pounds**	14.78	11.34	11.79	15.39	16.60	

* Use one measure - if not, indicate method

* Indicate size of core used and how meat was cooked.

3/4" core - Two steaks broiled to internal temperature of 160°.

Clemson College
Agricultural Experiment Station

I. PROJECT: SC 479 (S-10)

The Response of Sire Progenies to Management and Feeding Procedures

II. OBJECTIVES:

To investigate the response of sire progenies, as measured by live animal and carcass traits, to methods of producing slaughter cattle.

To evaluate the magnitude and importance of the average genotype with certain environmental influences.

To develop through selection herds of beef cattle with superior performance under South Carolina conditions.

III. PERSONNEL:

W. C. Godley, Animal Husbandman; H. H. Pierce, Superintendent, Coast Experiment Station; D. H. Kropf, Assistant Animal Husbandman; Mary J. Marbut, Food Technology Assistant; R. M. Rauton, Animal Husbandry Assistant; R. R. Ritchie, Animal Husbandman; J. H. Mitchell, Jr., Head, Food Technology and Human Nutrition Department.

IV. ACCOMPLISHMENTS DURING THE YEAR:

Two hundred and three cows were put in the breeding herds to produce calves for the 1961 calving season. The sixty-one purebred Hereford calves that were weaned were the progeny of six bulls. Four Angus bulls sired the eighty-two purebred Angus calves that were weaned. One Hereford bull was eliminated from the herd due to the performance of his offspring. A second Hereford bull sired a dwarf calf and was eliminated. Part interest in a Hereford bull was obtained from an out-of-state breeder. Several purebred Hereford heifers were purchased during the year to increase the size of the Hereford herd. It was possible to put major emphasis on production records in selecting the cows making up the Angus herds, because of the number of replacements available.

Eighteen bull calves representing seven sires were selected as possible herd bulls and were fed on a 140-day R.O.P. feeding test. Included were six Hereford and twelve Angus calves.

Thirty Angus and twenty-four Hereford steers representing ten sire groups that were calved in 1960 were fed for 70 days after weaning. These steers were slaughtered and detailed carcass data obtained.

V. FUTURE PLANS:

No major change in the project is contemplated. Increased emphasis will be placed on performance records in selecting both males and females for the breeding herds. All females will be checked for pregnancy approximately two months after the breeding season.

VI. PUBLICATIONS DURING THE YEAR:

None

VII. PUBLICATIONS PLANNED:

None

Submitted by: W. C. Godley

FORM I

160
S. C. (3)

COW PRODUCTION, 1961 CALF CROP

South Carolina State

Location	Summerville	Summerville	Summerville	Clemson	Clemson
Breed of sire	Angus	Angus	Hereford	Hereford	Angus	Angus
Breed of dam	Angus	Angus	Hereford	Hereford	Angus	Angus
Line or group[1]	C. B. B.	C. A.	CPH Clartone	SFR S.R.	BI 4709	G-34
No. cows exposed[2]	29	30	19	19	27	34
No. calves born[3]	18	23	17	12	23	30
Calving percent, born	62	77	89	63	85	88
Av. birth date	3/12/61	2/12/61	2/21/61	3/5/61	2/13/61	2/12/61
Av. birth weight	62.5	66.6	66.3	57.6	66.6	65.4
Number calves weaned	14	21	17	11	20	27
Calving percent, weaned	48	70	89	58	74	79
Av. weaning age, days	206	207	210	208	207	211
Adj. A. D. G.[5]	1.73	1.91	1.53	1.54	1.91	2.13
Av. type score[6]	11.1	11.6	9.6	10.4	11.6	11.7
Av. condition score[6]						

1 - Purebreds, grade, line, backcross, 3-breed cross, treatment, etc.
2 - Total number put in breeding herd.
3 - Total number born, dead + alive.
4 - Number weaned divided by number of cows exposed.
5 - Indicate adjustments.
6 - 15, 16 and 17 = Fancy
12, 13 and 14 = Choice
9, 10 and 11 = Good
6, 7 and 8 = Medium

Age of dam:
Age of calf:
Sex of calf:
Other: Creep feeding

FORM I

161
S. C. (4)

COW PRODUCTION, 1961 CALF CROP

South Carolina | State

Location	Clemson	Clemson	Clemson	Clemson		
Breed of sire	Hereford	Hereford	Hereford	Hereford		
Breed of dam	Hereford	Hereford	Hereford	Hereford		
Line or group[1]	SFR D.M.	G. M.	V. D.	Ch. Ad.		
No. cows exposed[2]	14	14	10	7		
No. calves born[3]	13	12	7	5		
Calving percent, born	93	88	70	71		
Av. birth date	3/1/61	2/13/61	3/20/61	2/16/61		
Av. birth weight	69.8	65.3	73.2	81.2		
Number calves weaned	12	11	5	5		
Calving percent, weaned	86	79	50	71		
Av. weaning age, days	216	210	200	215		
Adj. A. D. G.[5]	1.84	1.92	1.99	2.08		
Av. type score[6]	10.6	10.9	9.2	11.8		
Av. condition score[6]						

1 - Purebreds, grade, line, backcross, 3-breed cross, treatment, etc.
2 - Total number put in breeding herd.
3 - Total number born, dead + alive.
4 - Number weaned divided by number of cows exposed.
5 - Indicate adjustments. Age of dam:
Age of calf:
Sex of calf:
Other: Creep feeding
6 - 15, 16 and 17 = Fancy
12, 13 and 14 = Choice
9, 10 and 11 = Good
6, 7 and 8 = Medium

S. C. (5)

FORM II

POSTWEANING PERFORMANCE OF CALVES FED IN 1961

South Carolina State

	Location	Clemson	Clemson	Clemson	Clemson	Clemson	Clemson
	Breed of sire	Angus	Angus	Angus	Angus	Angus	Angus
	Breed of dam	Angus	Angus	Angus	Angus	Angus	Angus
	Line or group *	G 14	G 34	CA	BI 4709	CK	CEL
Bulls	No. in group	1				2	
	Feed regime **						
	Av. init. age	232.0				211.0	
	Av. init. wt.	465.0				485.0	
	Av.no.da.fed	140.0				140.0	
	Av. final wt.	810.0				780.0	
	ADG on test	2.46				2.11	
	Av. type sc.	13.7				11.0	
	Av. cond. sc.						
	Av. inbreeding	0				0	
Heifers	No. in group						
	Feed regime **						
	Av. init. age						
	Av. init. wt.						
	Av. no.da.fed						
	Av. final wt.						
	ADG on test						
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						
Steers	No. in group	10	11	3	1	4	1
	Feed regime **						
	Av. init. age	425.1	419.7	418.0	456.0	421.5	392.0
	Av. init. wt.	600.0	608.6	625.0	535.0	613.8	540.0
	Av.no.da.fed	70.0	70.0	70.0	70.0	70.0	70.0
	Av. final wt.	774.0	768.2	795.0	650.0	782.5	680.0
	ADG on test	2.59	2.33	2.43	1.64	2.41	2.00
	Av. type sc.	8.9	8.9	9.6	8.3	9.0	8.8
	Av. cond. sc.						
	Av. inbreeding	0	0	0	0	0	0

* Show whether station-owned or cooperator-owned, in addition to other group designation.

**

	Bulls	Steers	Heifers
How fed - full, limited, etc.	Full-fed	Limited	
Pounds/day over feeding period			
Ration:	Bulls full-fed mixture of grain and hay.	Steers within sire groups were randomly assigned, where possible, to (1) dry-lot + Coastal Bermuda hay or pellets, (2) fescue pasture + cracked corn, and (3) rye-grass pasture + sh. corn.	

FORM II

POSTWEANING PERFORMANCE OF CALVES FED IN 1961

South Carolina State

	Location	Breed of sire	Breed of dam	Line or group *	No. in group	Feed regime **	Av. init. age	Av. init. wt.	Av.no.da.fed	Av. final wt.	ADG on test	Av. type sc.	Av. cond. sc.	Av. inbreeding
Bulls	Clemson	Angus	Angus	C.E.E.	2	-	211.5	445.0	140.0	740.0	2.11	12.7		0
Heifers														
Steers	Clemson	Angus	Hereford	G.M.	10		438.5	517.5	70.0	695.0	2.54	7.9		0
	Clemson	Hereford	Hereford	J.M.	8		407.1	549.4	70.0	709.4	2.29	7.8		0
	Clemson	Hereford	Hereford	D.D.	3		430.7	593.3	70.0	763.3	2.43	8.7		0
	Clemson	Hereford	Hereford	RFPD 57	3		415.7	543.3	70.0	713.3	2.43	8.0		0

* Show whether station-owned or cooperator-owned, in addition to other group designation.

**

	Bulls	Steers	Heifers
How fed - full, limited, etc.	Full-fed	Limited	
Pounds/day over feeding period			
Ration:	Bulls full-fed mixture of grain and hay.	Steers within sire groups randomly assigned to (1) dry lot + Coastal Bermuda hay or pellets, (2) fescue pasture + cr. sh. corn, and (3) ryegrass-crimson clover pasture + cr. sh. corn.	

FORM III 1961

SLAUGHTER DATA,

South Carolina State

Location	Clemson	Clemson	Clemson	Clemson	Clemson	Clemson
Breed of sire	Angus	Angus	Angus	Angus	Angus	Angus
Breed of dam	Angus	Angus	Angus	Angus	Angus	Angus
Line or group	C. A.	BI 4709	G 14	G 34	CEL	CK
Sex	Steer	Steer	Steer	Steer	Steer	Steer
Age at slaughter	492.0	530.0	499.1	493.7	466.0	495.5
No. slaughtered	3	1	10	11	1	4
Days in feedlot	70	70	70	70	70	70
Final feedlot wt.	795.0	650.0	774.0	768.2	680.0	782.5
Slaughter wt.,live	771.0	635.0	745.0	742.3	665.0	751.3
Carcass wt., cold (1)	451.3	364.0	424.0	428.7	377.0	431.2
Dressing percent, cold	58.48	57.32	56.69	57.62	56.69	57.45
Carcass grade, quality	11.3	10.0	9.2	9.2	8.0	9.3
Carcass grade, cutability						
Estimated percent, kidney fat						
Ribeye area/100 lbs. carcass	2.07	2.20	2.26	2.16	2.38	2.10
Marbling score (2)	16.3	13.0	11.0	11.5	8.0	11.5
Fat thickness over ribeye*	.48	.29	.25	.27	.21	.27
W-B shear force, pounds**	20.0	20.2	19.6	18.7	24.0	22.8

* Use one measure - if not, indicate method

** Indicate size of core used and how meat was cooked.

(1) Hot carcass weight.
(2) Grades and marbling scores by College Meats man.
Marbling score: Trace = 8
Slight amount = 11
Small amount = 14
Moderate amount = 17

FORM III

SLAUGHTER DATA, 1961

South Carolina State

Location	Clemson	Clemson	Clemson	Clemson		
Breed of sire	Hereford	Hereford	Hereford	Hereford		
Breed of dam	Hereford	Hereford	Hereford	Hereford		
Line or group	D. D.	G. M.	J. M.	RFPD 57		
Sex	Steer	Steer	Steer	Steer		
Age at slaughter	504.7	512.5	481.1	489.7		
No. slaughtered	3	10	8	3		
Days in feedlot	70.0	70.0	70.0	70.0		
Final feedlot wt.	763.3	695.0	709.4	713.3		
Slaughter wt.,live	740.0	673.5	681.3	678.3		
Carcass wt., cold (1)	423.3	376.4	381.8	388.0		
Dressing percent, cold	57.21	55.84	56.01	57.21		
Carcass grade, quality	8.3	7.8	8.1	8.0		
Carcass grade, cutability						
Estimated percent, kidney fat						
Ribeye area/100 lbs. carcass	2.12	2.09	2.18	2.42		
Marbling score (2)	9.3	7.5	8.4	8.0		
Fat thickness over ribeye*	.21	.17	.12	.12		
W-B shear force, pounds**	24.5	25.1	23.8	22.6		

* Use one measure - if not, indicate method

** Indicate size of core used and how meat was cooked.

One-inch core; steaks broiled

(1) Hot carcass weight.

(2) Grades and marbling scores by College Meats man.
Marbling score: Trace = 8
Slight Amount = 11
Small Amount = 14
Moderate Amount = 17

University of Tennessee
Agricultural Experiment Station

I. PROJECT: Hatch 61 (S-10)

The Improvement of the Producing Ability of Beef Cattle.

II. OBJECTIVES:

To develop lines or line crosses, or combinations of lines and crosses, of beef cattle which will make the most efficient use of Tennessee pastures and forages and that will result in an improvement of such characters as rate of gain, economy of gain, carcass quality, fertility and longevity.

To develop effective breeding techniques for the improvement of existing lines of beef cattle.

To investigate the productivity of existing lines of beef cattle.

To investigate the effect of different levels of nutrition on the development of type and conformation, economy of gain, fertility and longevity.

III. PERSONNEL:

C. S. Hobbs, R. J. Cooper, R. S. Temple, J. W. Cole, C. B. Ramsey
J. B. McLaren, R. A. Reynolds, B. B. Wilson, J. H. Felts, J. A. Odom,
B. L. Whittenburg and L. Safley.

IV. ACCOMPLISHMENTS DURING THE YEAR:

Performance records from birth to weaning were collected on about 854 calves. These data include performance records on progeny of 26 Hereford sires at six locations and 21 Angus sires at four locations to obtain basic data on mature size variation in condition at different locations and between years. A comparison between weights and grades at about four months and at weaning indicates a close relationship.

During 1962, an additional 140 heifers were irradiated in the UT-AEC project to evaluate the effect of irradiation on the lifetime performance. Approximately 200 survivors irradiated at the following levels: 0, 200r, 300r, 400r and 600r (in two 300r exposure doses) are being used to progeny test eight bulls per year.

Three Tennessee State Institutional herds are to be added to the program during the next two years. Seven bulls were bred for progeny performance studies. The three institutional herds will include approximately 500 cows.

Thirty-two Angus and Hereford bull calves from various stations were used to compare four methods of developing herd bulls from weaning age to approximately twenty months of age. Forty-eight Angus bull calves were selected at one location to feed from weaning to approximately twenty months of age to obtain performance data on individuals and sire progenies.

Carcass data were secured on 76 yearling Hereford steers by twelve sires from one station, fifteen yearling Hereford steers by two sires from another station and from 36 yearling Angus steers by seven sires from another station. Detailed carcass data have been obtained on seven steer progeny from four sires in cooperation with the Types and Breeds project.

Plans have been initiated at two locations to use the herd in a selection study to compare a breeding program where sire replacements are selected from within the herd to a program where sire replacements are selected from outside the herd. The same breeding plans and selection criteria will be maintained for each group and a control group maintained as a basis to measure the effect of each program.

In the cooperative program with the extension service, individual calf records have been processed on 1883 calves and summaries by sire progeny and herds have been made for sixty-five breeders.

V. FUTURE PLANS:

Continue present work on getting data on all sire and dam progeny in lists at approximately 120-140 days and at weaning time. Obtain weights and condition grades on cows at about weaning time, November 1, and in addition, in certain herds on January 1 and July 1.

Continue studying present and new methods of breeding systems and developing lines at different stations.

Expand the carcass evaluation and consumer acceptance phases.

Make additional use of the IBM system for more detailed analysis and studies.

VI. PUBLICATIONS DURING THE YEAR:

Anderson, J. M. 1962. Four Methods of Developing Bulls to Approximately 20 Months of Age. M. S. Thesis, University of Tennessee Library.

Austin, J. W., E. W. Hupp and R. L. Murphree. 1961. Comparison of Quality of Bull Semen Collected in the Artificial Vagina and by Electroejaculation. Journal of Dairy Science, 44:2292-2297.

Hall, O. G., C. S. Hobbs and T. W. High. 1961. Finishing Rations for Beef Steers. Tennessee Farm and Home Science, Progress Report 39.

Merriman, G. M. and C. S. Hobbs. 1961. Anaplasmosis in Tennessee Cattle. Tennessee Farm and Home Science, Progress Report 39.

VII. PUBLICATIONS PLANNED:

None

Submitted by: C. S. Hobbs

* * * * *** * * * *

I. PROJECT: Hatch 65 (S-10)

The Detection of Animals Heterozygous for Recessive Bovine Dwarfism

II. OBJECTIVES:

To investigate methods of identifying animals heterozygous for recessive bovine dwarfism

III. PERSONNEL:

R. J. Cooper, R. A. Reynolds, C. S. Hobbs, R. S. Temple, H. J. Smith and John Leeman.

IV. ACCOMPLISHMENTS DURING THE YEAR:

A group of thirty pedigree-clean Hereford cows is being maintained with about half of them mated artificially to a dwarf bull and the others mated to a pedigree-clean bull each year. In 1961, twenty carrier and eight clean calves were produced from these matings.

The above calves were x-rayed before they were two weeks old. Also, body measurements were taken at one week, four months and six and one-half months of age. As in 1960, the calves sired by the dwarf bull were heavier than calves of the same age sired by the clean bull. They tended to be taller at the withers, longer bodied and larger in cannon circumference (the same dwarf bull and clean bull sired the calves born in 1960 and 1961).

In connection with another project, a dwarf calf and a normal calf were dosed with Ca^{45} at two weeks of age and each time they doubled their weight until they were around 18 months old. They were sacrificed and autoradiograms taken of certain bones at that time.

V. FUTURE PLANS:

The group of 30 pedigree-clean Hereford cows is being maintained with half of them mated to a dwarf bull and half of them mated to a clean bull each year.

The carbazole and napthoresorcinal tests for hexuronic acids in the urine will be made on the carrier and clean calves born in 1962. X-rays and body measurements will be taken on these calves as they have been previously.

VI. PUBLICATIONS DURING THE YEAR:

None

VII. PUBLICATIONS PLANNED:

None

Submitted by: R. J. Cooper

FORM I

COW PRODUCTION, 1961 CALF CROP

	Tennessee					State
Location	Alcoa	Alcoa	Alcoa	Alcoa	Alcoa	Alcoa
Breed of sire	Hereford	Hereford	Hereford	Hereford	Hereford	Hereford
Breed of dam	Hereford	Hereford	Hereford	Hereford	Hereford	Hereford
Line or group[1]	2037	9505	9264	9529	9110	9107
No. cows exposed[2]	15	29	27	26	14	13
No. calves born[3]	9	19	18	3	8	3
Calving percent, born	60	66	67	12	57	23
Av. birth date				2-25-61	2-6-61	1-31-61
Av. birth weight				70	66	74
Number calves weaned	8	17	16	3	8	3
Calving percent, weaned	53	59	59	12	57	23
Av. weaning age, days				229	250	256
Adj. A. D. G.[5]				1.75	1.77	1.90
Av. type score[6]				13.3	13.2	14.7
Av. condition score[6]						

1 - Purebreds, grade, line, backcross, 3-breed cross, treatment, etc.
2 - Total number put in breeding herd.
3 - Total number born, dead + alive.
4 - Number weaned divided by number of cows exposed.
5 - Indicate adjustments.
6 - 15, 16 and 17 = Fancy
12, 13 and 14 = Choice
9, 10 and 11 = Good
6, 7 and 8 = Medium

COW PRODUCTION, 1961 CALF CROP

	Tennessee					State
Location	Alcoa	Alcoa	Alcoa	Alcoa	Alcoa	Alcoa
Breed of sire	Hereford	Hereford	Hereford	Hereford	Hereford	Hereford
Breed of dam	Hereford	Hereford	Hereford	Hereford	Hereford	Hereford
Line or group[1]	2037	9533	9490	9605	9609	9264
No. cows exposed[2]	47	33	17	29	24	23
No. calves born[3]	37	26	16	24	14	18
Calving percent, born	79	79	59	83	58	78
Av. birth date	3-15-61	3-16-61	2-11-61	2-23-61	3-1-61	2-14-61
Av. birth weight	76	66	84	71	78	79
Number calves weaned	32	24	16	21	12	17
Calving percent, weaned	68	73	94	72	50	74
Av. weaning age, days	211	212	248	231	224	244
Adj. A. D. G.[5]	1.77	1.78	1.97	1.80	1.84	1.75
Av. type score[6]	12.2	12.3	12.4	12.2	13.1	12.7
Av. condition score[6]				10.4	10.7	

1 - Purebreds, grade, line, backcross, 3-breed cross, treatment, etc.
2 - Total number put in breeding herd.
3 - Total number born, dead + alive.
4 - Number weaned divided by number of cows exposed.
5 - Indicate adjustments.
6 - 15, 16 and 17 = Fancy
12, 13 and 14 = Choice
9, 10 and 11 = Good
6, 7 and 8 = Medium

FARM I

1, 2
Tenn. (7)

COW PRODUCTION, 1961 CALF CROP

	Tennessee					State
Location	Alcoa	Alcoa	Alcoa	Alcoa	Alcoa	Alcoa
Breed of sire	Hereford	Hereford	Angus	Angus	Angus	Angus
Breed of dam	Hereford	Hereford	Angus	Angus	Angus	Angus
Line or group[1]	9023	9156	1167	9069	9123	9309
No. cows exposed[2]	22	21	6	9	13	14
No. calves born[3]	13	11	2	3	0	12
Calving percent, born	59	52	33	33		86
Av. birth date	2-13-61	2-21-61	4-15-61	2-8-61		3-25-61
Av. birth weight	70	73	81	57		60
Number calves weaned	13	11	2	3	0	11
Calving percent, weaned	59	52	33	33		79
Av. weaning age, days	239	232	177	244		198
Adj. A. D. G.[5]	1.69	1.83	2.10	1.89		1.84
Av. type score[6]	12.9	13.0	13.2	13.7		12.5
Av. condition score[6]						

1 - Purebreds, grade, line, backcross, 3-breed cross, treatment, etc.
2 - Total number put in breeding herd.
3 - Total number born, dead + alive.
4 - Number weaned divided by number of cows exposed.
5 - Indicate adjustments.
6 - 15, 16 and 17 = Fancy
12, 13 and 14 = Choice
9, 10 and 11 = Good
6, 7 and 8 = Medium

FORM I

173
Tenn. (8)

COW PRODUCTION, 1961 CALF CROP

	Tennessee					State
Location	Alcoa	Alcoa	Ames	Ames	Ames	Ames
Breed of sire	Angus	Angus	Angus	Angus	Angus	Angus
Breed of dam	Angus	Angus	Angus	Angus	Angus	Angus
Line or group[1]	9010	9709	8657	9385	9193	9025
No. cows exposed[2]	7	22	17	24	22	21
No. calves born[3]	3	5	11	19	20	20
Calving percent, born	43	23	65	79	91	95
Av. birth date	2-12-61					
Av. birth weight	63					
Number calves weaned	3	5	8	17	20	20
Calving percent, weaned	43	23	47	71	91	95
Av. weaning age, days	240					
Adj. A. D. G.[5]	1.65					
Av. type score[6]	13.2					
Av. condition score[6]						

1 - Purebreds, grade, line, backcross, 3-breed cross, treatment, etc.
2 - Total number put in breeding herd.
3 - Total number born, dead + alive.
4 - Number weaned divided by number of cows exposed.
5 - Indicate adjustments.
6 - 15, 16 and 17 = Fancy
12, 13 and 14 = Choice
9, 10 and 11 = Good
6, 7 and 8 = Medium

FORM I

1961

COW PRODUCTION, CALF CROP

Tennessee State

Location	Ames	Ames	Ames	Ames	Ames	Ames
Breed of sire	Angus	Angus	Angus	Angus	Angus	Angus
Breed of dam	Angus	Angus	Angus	Angus	Angus	Angus
Line or group[1]	8688	9537	9777	9295	9537	9777
No. cows exposed[2]	10	23	25	24	22	21
No. calves born[3]	9	16	20	15	20	12
Calving percent, born	90	70	80	63	91	57
Av. birth date				3-17-61	2-16-61	2-24-61
Av. birth weight				59	61	66
Number calves weaned	9	15	17	14	17	12
Calving percent, weaned	90	65	68	58	77	57
Av. weaning age, days				225	235	227
Adj. A. D. G.[5]				1.68	1.77	1.87
Av. type score[6]				12.1	12.3	12.6
Av. condition score[6]						

1 - Purebreds, grade, line, backcross, 3-breed cross, treatment, etc.
2 - Total number put in breeding herd.
3 - Total number born, dead + alive.
4 - Number weaned divided by number of cows exposed.
5 - Indicate adjustments.
6 - 15, 16 and 17 = Fancy
12, 13 and 14 = Choice
9, 10 and 11 = Good
6, 7 and 8 = Medium

FORM 1

175
Tenn.(10)

COW PRODUCTION; 1961 CALF CROP

	Tennessee					State
Location	Ames	Ames	Ames	Ames	Columbia	Ames
Breed of sire	Angus	Angus	Angus	Angus	Hereford	Angus
Breed of dam	Angus	Angus	Angus	Angus	Hereford	Angus
Line or group[1]	1084	9193	9025	8688	2014	8657
No. cows exposed[2]	24	21	33	25	23	24
No. calves born[3]	15	20	25	20	20	17
Calving percent, born	21	95	76	80	87	71
Av. birth date	2-15-61	2-15-61	2-15-61	2-16-61	2-11-61	3-2-61
Av. birth weight	59	60	60	59	69	62
Number calves weaned	13	17	22	19	19	13
Calving percent, weaned	54	81	67	76	83	54
Av. weaning age, days	236	237	236	230	258	221
Adj. A. D. G.[5]	1.91	1.80	1.79	1.82	1.74	1.88
Av. type score[6]	12.6	11.6	12.8	12.4	11.2	12.4
Av. condition score[6]						

1 - Purebreds, grade, line, backcross, 3-breed cross, treatment, etc.
2 - Total number put in breeding herd.
3 - Total number born, dead + alive.
4 - Number weaned divided by number of cows exposed.
5 - Indicate adjustments.
6 - 15, 16 and 17 = Fancy
12, 13 and 14 = Choice
9, 10 and 11 = Good
6, 7 and 8 = Medium

176
Tenn. (11)

FORM I

1961

COW PRODUCTION, CALF CROP

	Tennessee					State
Location	Ames	Crossville	Crossville	Crossville	Crossville	Crossville
Breed of sire	Angus	Angus	Angus	Angus	Angus	Angus
Breed of dam	Angus	Angus	Angus	Angus	Angus	Angus
Line or group[1]	9385	9123	9069	9010	5063	5207
No. cows exposed[2]	23	41	19	19	34	32
No. calves born[3]	11	10	5	8	26	30
Calving percent, born	48	24	26	42	76	93
Av. birth date	2-20-61	2-19-61	2-13-61	2-11-61	3-27-61	3-26-61
Av. birth weight	62	62	62	64	62	60
Number calves weaned	8	10	5	6	24	27
Calving percent, weaned	35	24	26	32	71	84
Av. weaning age, days	231	255	261	263	219	220
Adj. A. D. G.[5]	1.81	1.95	1.86	1.78	1.98	1.78
Av. type score[6]	12.9	13.1	12.7	14.2	12.3	12.5
Av. condition score[6]						

1 - Purebreds, grade, line, backcross, 3-breed cross, treatment, etc.
2 - Total number put in breeding herd.
3 - Total number born, dead + alive.
4 - Number weaned divided by number of cows exposed.
5 - Indicate adjustments.
6 - 15, 16 and 17 = Fancy
12, 13 and 14 = Choice
9, 10 and 11 = Good
6, 7 and 8 = Medium

FORM I

177
Tenn. (12)

COW PRODUCTION, 1961 CALF CROP

Tennessee State

Location	Crossville	Crossville	Crossville	Springfield---------		Columbia
Breed of sire	Angus	Angus	Angus	Hereford	Hereford	Hereford
Breed of dam	Angus	Angus	Angus	Hereford	Hereford	Hereford
Line or group[1]	5244	1169	5448	2085	9217	9618
No. cows exposed[2]	28	16	17	17	34	24
No. calves born[3]	25	15	16	13	33	18
Calving percent, born	89	94	94	76	97	75
Av. birth date	4-12-61	4-6-61	2-17-61	4-8-61	2-18-61	2-21-61
Av. birth weight	65	67	63	62	70	65
Number calves weaned	22	13	15	9	30	16
Calving percent, weaned	79	81	88	53	88	67
Av. weaning age, days	203	209	257	194	243	240
Adj. A. D. G.[5]	1.91	1.99	2.07	1.53	1.73	1.61
Av. type score[6]	12.1	12.9	12.4	11.4	12.3	11.4
Av. condition score[6]						

1 - Purebreds, grade, line, backcross, 3-breed cross, treatment, etc.
2 - Total number put in breeding herd.
3 - Total number born, dead + alive.
4 - Number weaned divided by number of cows exposed.
5 - Indicate adjustments.
6 - 15, 16 and 17 = Fancy
12, 13 and 14 = Choice
9, 10 and 11 = Good
6, 7 and 8 = Medium

FORM I

178
Tenn. (13)

COW PRODUCTION, 1961 CALF CROP

Tennessee State

Location	Columbia	Greeneville		Alcoa	Alcoa
Breed of sire	Hereford	P.Hereford	P.Hereford	Angus	Angus
Breed of dam	Hereford	Hereford	Hereford	Grade	Grade
Line or group[1]	9505	9868	9983	3204	9209	1169
No. cows exposed[2]	24	27	30	25	4	21
No. calves born[3]	21	25	25	23	2	0
Calving percent, born	88	93	83	92	50	
Av. birth date	2-24-61	2-23-61	2-10-61	2-19-61	3-3-61	
Av. birth weight	70	67	67	70	45	
Number calves weaned	18	14	21	18	1	
Calving percent, weaned	75	51	70	72	25	
Av. weaning age, days	237	224	237	228	228	
Adj. A. D. G.[5]	1.68	1.88	1.93	1.98	1.82	
Av. type score[6]	11.7	10.9	11.8	11.1	12.0	
Av. condition score[6]						

1 - Purebreds, grade, line, backcross, 3-breed cross, treatment, etc.
2 - Total number put in breeding herd.
3 - Total number born, dead + alive.
4 - Number weaned divided by number of cows exposed.
5 - Indicate adjustments.
6 - 15, 16 and 17 = Fancy
12, 13 and 14 = Choice
9, 10 and 11 = Good
6, 7 and 8 = Medium

FORM I

179
Tenn. (14)

COW PRODUCTION, 1961 CALF CROP

State: Tennessee

Location	Oak Ridge	Oak Ridge	Oak Ridge	Oak Ridge	Knoxville	Knoxville
Breed of sire	Hereford	Hereford	Hereford P.	Hereford	Hereford	Hereford
Breed of dam	Hereford	Hereford	Hereford	Hereford	Hereford	Hereford
Line or group[1]	2020	9484	3224	9988	9529	9605
No. cows exposed[2]	19	19	34	13	7	22
No. calves born[3]	18	19	21	8	3	11
Calving percent, born	95	100	62	62	43	50
Av. birth date	2-6-61	2-21-61	2-13-61	3-13-61		
Av. birth weight	63	64	74	58		
Number calves weaned	17	18	18	7	3	11
Calving percent, weaned	89	95	53	54	43	50
Av. weaning age, days	255	240	248	220		
Adj. A. D. G.[5]	1.90	1.85	1.83	1.75		
Av. type score[6]	12.3	12.3	12.6	11.8		
Av. condition score[6]						

1 - Purebreds, grade, line, backcross, 3-breed cross, treatment, etc.
2 - Total number put in breeding herd.
3 - Total number born, dead + alive.
4 - Number weaned divided by number of cows exposed.
5 - Indicate adjustments.
6 - 15, 16 and 17 = Fancy
12, 13 and 14 = Choice
9, 10 and 11 = Good
6, 7 and 8 = Medium

180

FORM I

Tenn. (15)

COW PRODUCTION, 1961 CALF CROP

	Tennessee					State
Location	Knoxville	Knoxville	Knoxville	Knoxville	Knoxville	Knoxville
Breed of sire	Angus	Angus	Angus	Angus	Hereford	Hereford
Breed of dam	Angus	Angus	Angus	Angus	Hereford	Hereford
Line or group[1]	9309	1249	9123	9069	9075	9110
No. cows exposed[2]	7	17	13	11	31	9
No. calves born[3]	7	12	2	3	20	2
Calving percent, born	100	71	15	27	65	22
Av. birth date		3-19-61	2-24-61	2-9-61	3-22-61	2-18-61
Av. birth weight		68	45	51	67	64
Number calves weaned	6	10	2	3	14	2
Calving percent, weaned	86	59	15	27	45	22
Av. weaning age, days		199	222	237	199	231
Adj. A. D. G.[5]		2.19	2.01	2.10	1.95	1.68
Av. type score[6]		12.7	12.5	13.0	11.6	11.8
Av. condition score[6]						

1 - Purebreds, grade, line, backcross, 3-breed cross, treatment, etc.
2 - Total number put in breeding herd.
3 - Total number born, dead + alive.
4 - Number weaned divided by number of cows exposed.
5 - Indicate adjustments.
6 - 15, 16 and 17 = Fancy
12, 13 and 14 = Choice
9, 10 and 11 = Good
6, 7 and 8 = Medium

FORM I

COW PRODUCTION, 1961 CALF CROP

Tennessee

Location	Knoxville	Knoxville	Knoxville	Knoxville		State
Breed of sire	Hereford	Angus	Angus	Angus		
Breed of dam	Hereford	Angus	Angus	Angus		
Line or group[1]	2215	1167	9209	9010		
No. cows exposed[2]	5	2	11	18		
No. calves born[3]	1	2	3	7		
Calving percent, born	20	100	18	5		
Av. birth date		1-30-61	3-8-61	2-14-61		
Av. birth weight		60	46	64		
Number calves weaned	0	2	1	6		
Calving percent, weaned		100	9	33		
Av. weaning age, days		247	210	232		
Adj. A. D. G.[5]		1.78	1.81	2.21		
Av. type score[6]		13.2	12.0	14.7		
Av. condition score[6]		10.8	9.5	11.2		

1 - Purebreds, grade, line, backcross, 3-breed cross, treatment, etc.
2 - Total number put in breeding herd.
3 - Total number born, dead + alive.
4 - Number weaned divided by number of cows exposed.
5 - Indicate adjustments.
6 - 15, 16 and 17 = Fancy
12, 13 and 14 = Choice
9, 10 and 11 = Good
6, 7 and 8 = Medium

FORM C

POSTWEANING PERFORMANCE OF CALVES FED IN 1961

Tennessee State

	Location	Crossville			Columbia	Columbia	Columbia
	Breed of sire	Angus	Angus	Angus	Hereford	Hereford	Hereford
	Breed of dam	Angus	Angus	Angus	Hereford	Hereford	Hereford
	Line or group *	I	II	III	33	825	14
Bulls	No. in group						
	Feed regime **						
	Av. init. age.						
	Av. init. wt.						
	Av. no. da. fed						
	Av. final wt.						
	ADG on test						
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						
Heifers	No. in group	18	18	14	7	5	1
	Feed regime **						
	Av. init. age	301	300	273	210	243	226
	Av. init. wt.	466	473	385	380	395	355
	Av. no. da. fed	122	122	122	217	217	217
	Av. final wt.	555	614	517	613	630	575
	ADG on test	0.65	1.16	1.08	1.07	1.08	1.01
	Av. type sc.	11.2	12.0	11.5	11.3	11.1	9.5
	Av. cond. sc.						
	Av. inbreeding						
Steers	No. in group						
	Feed regime **						
	Av. init. age						
	Av. init. wt.						
	Av. no. da. fed						
	Av. final wt.						
	ADG on test						
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						

* Show whether station-owned or cooperator-owned, in addition to other group designation.

	Bulls	Steers	Heifers
How fed - full, limited, etc.			Limited
Pounds/day over feeding period			

Ration:

	CORN	HAY	SILAGE
Crossville: I (heavy)	-	4 lb.	23 lb.
II (heavy)	5.3 lb.	4 lb.	16 lb.
III (light)	5.3 lb.	4 lb.	11 lb.

Columbia: Hay and silage until around April 1, then put on pasture until end of test, May 11.

FORM II

POSTWEANING PERFORMANCE OF CALVES FED IN 1961

Tennessee State

	Location	Knoxville	Knoxville	Knoxville	Knoxville		
	Breed of sire	Hereford	Hereford	Angus	Angus		
	Breed of dam	Hereford	Hereford	Angus	Angus		
	Line or group *	618	9156	1167	5448		
Bulls	No. in group						
	Feed regime **						
	Av. init. age						
	Av. init. wt.						
	Av.no.da.fed						
	Av. final wt.						
	ADG on test						
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						
Heifers	No. in group						
	Feed regime **						
	Av. init. age						
	Av. init. wt.						
	Av. no.da.fed						
	Av. final wt.						
	ADG on test						
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						
Steers	No. in group	2	3	3	3		
	Feed regime **						
	Av. init. age	194	139	192	197		
	Av. init. wt.	422	334	412	433		
	Av.no.da.fed	221	302	263	209		
	Av. final wt.	894	905	901	897		
	ADG on test	2.13	1.89	1.86	2.22		
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						

* Show whether station-owned or cooperator-owned, in addition to other group designation.

**	Bulls	Steers	Heifers
How fed - full, limited, etc.		Full-fed	
Pounds/day over feeding period			
Ration: (1) Fed to 900 lbs.		Ave. daily ration for entire test - self-fed: 5 lbs. hay, 10 lbs. corn, 0.5 lbs. molasses, 1.4 lb. CSM, 0.1 lb. salt, 0.1 lb. di-cal., and 2.2 lb. calf-starter.	

FORM III

SLAUGHTER DATA, 1961

	Tennessee					State
Location	Alcoa	Alcoa	Alcoa	Alcoa	Alcoa	Alcoa
Breed of sire	Hereford	Hereford	Hereford	Hereford	Hereford	Hereford
Breed of dam	Hereford	Hereford	Hereford	Hereford	Hereford	Hereford
Line or group	9264	2892	9023	9075	9484	9513
Sex	Steer	Steer	Steer	Steer	Steer	Steer
Age at slaughter	643	670	651	628	609	625
No. slaughtered	7	10	5	6	5	8
Days in feedlot	107	123	129	94	115	89
Final feedlot wt.	996	1065	972	1032	958	999
Slaughter wt.,live	996	1065	972	1032	958	999
Carcass wt., cold	576	619	551	592	541	582
Dressing percent, cold	57.8	58.1	56.7	57.4	56.4	58.2
Carcass grade, quality	9.6	9.3	8.8	9.3	9.0	9.5
Carcass grade, cutability						
Estimated percent, kidney fat	2.4	3.0	2.4	2.0	2.1	2.6
Ribeye area/100 lbs. carcass	1.93	1.73	1.75	1.80	1.88	1.98
Marbling score	4	4	4	4	3	4
Fat thickness over ribeye*	8	9	10	9	7	7
W-B shear force, pounds**	16.7	15.5	17.5	17.3	17.7	18.1

* Use one measure - if not, indicate method

** Indicate size of core used and how meat was cooked.

One-inch core

PART III

SLAUGHTER DATA, 1961

	Tennessee					State
Location	Alcoa	Alcoa	Alcoa	Alcoa	Alcoa	Alcoa
Breed of sire	Hereford	Angus	Hereford	Hereford	Hereford	Hereford
Breed of dam	Hereford	Angus	Hereford	Hereford	Hereford	Hereford
Line or group	9533	1167	9505	3180	9618	9156
Sex	Steer	Steer	Steer	Steer	Steer	Steer
Age at slaughter	645	653	636	624	646	654
No. slaughtered	7	1	12	3	6	6
Days in feedlot	122	89	104	89	94	111
Final feedlot wt.	1021	845	1000	950	1062	1016
Slaughter wt., live	1021	845	1000	950	1062	1016
Carcass wt., cold	586	502	586	540	629	592
Dressing percent, cold	57.4	59.4	58.6	56.8	59.2	58.3
Carcass grade, quality	9.1	11.0	8.8	8.7	9.3	9.2
Carcass grade, cutability						
Estimated percent, kidney fat	2.4	2.0	2.3	2.2	2.2	2.5
Ribeye area/100 lbs. carcass	1.87	2.44	1.60	1.95	1.80	1.86
Marbling score	4	4	3	3	4	4
Fat thickness over ribeye*	8	7	9	7	8	9
W-B shear force, pounds**	16.9	21.0	17.9	19.9	17.1	16.8

* Use one measure - if not, indicate method

** Indicate size of core used and how meat was cooked.

Tenn. (21)

FORM III

SLAUGHTER DATA, 1961

	Tennessee					State
Location	Alcoa	Crossville	Crossville	Crossville	Crossville	Crossville
Breed of sire	Hereford	Angus	Angus	Angus	Angus	Angus
Breed of dam	Hereford	Angus	Angus	Angus	Angus	Angus
Line or group	9407	63	448	207	244	186
Sex	Steer	Steer	Steer	Steer	Steer	Steer
Age at slaughter	610	627	634	621	586	606
No. slaughtered	1	1	1	7	6	5
Days in feedlot	89	112	112	112	112	112
Final feedlot wt.	880	816	970	924	879	884
Slaughter wt.,live	880	835	955	914	872	876
Carcass wt., cold	505	460	575	529	484	495
Dressing percent, cold	57.4	56.4	59.3	57.2	55.1	56.0
Carcass grade, quality	10.0	11.0	10.0	12.0	11.5	10.0
Carcass grade, cutability						
Estimated percent, kidney fat	2.0	4.0	2.8	3.6	3.3	3.4
Ribeye area/100 lbs. carcass	2.19	2.22	2.14	1.88	2.09	1.93
Marbling score	4	5	4	6	5	4
Fat thickness over ribeye*	11.0	7	11	12	7	8
W-B shear force, pounds**	17.7	17.7	15.4	17.5	15.8	14.0

* Use one measure - if not, indicate method

** Indicate size of core used and how meat was cooked.

FORM III

SLAUGHTER DATA, 1961

Tennessee State

Location	Crossville	Crossville	Greeneville			
Breed of sire	Angus	Angus	Hereford	Hereford		
Breed of dam	Angus	Angus	Hereford	Hereford		
Line or group	26	702	9717	9118		
Sex	Steer	Steer	Steer	Steer		
Age at slaughter	625	600	672	647		
No. slaughtered	7	8	8	7		
Days in feedlot	112	112	84	84		
Final feedlot wt.	936	910	980	967		
Slaughter wt., live	936	909	949	937		
Carcass wt., cold	541	524	571	558		
Dressing percent, cold	57.8	57.6	58.3	58.0		
Carcass grade, quality	11.3	11.4	9.9	9.7		
Carcass grade, cutability						
Estimated percent, kidney fat	3.3	2.9	2.9	2.9		
Ribeye area/100 lbs. carcass	1.97	2.04	1.96	2.05		
Marbling score	5	5	4	4		
Fat thickness over ribeye*	9	10	8	8		
W-B shear force, pounds**	16.6	15.8	21.8	18.6		

* Use one measure - if not, indicate method

** Indicate size of core used and how meat was cooked.

Texas A and M College
Agricultural Experiment Station

I. PROJECT: Animal Husbandry 650, AHRD Line Project d1-22, (S-10)

The Improvement of Production and Desirability of Beef Through Breeding Methods.

II. OBJECTIVES:

To estimate and further test by selection and breeding, genetic parameters including heritability, heterotic effect and genetic correlations for:

1. Weaning weight
2. Post-weaning feedlot and pasture gain
3. Gain during the summer months
4. Beef value of the carcass including distribution of carcass weight among various cuts and muscle, fat and bone.
5. Eating desirability of the beef.
6. Other characters as their possible importance becomes evident.

To test breeds and strains of unknown or unrecorded productivity.

To develop procedures and techniques adequate for practical application in:

1. Record keeping
2. Artificial insemination
3. Other areas involved in management that present an obvious need in a breeding program.

III. PERSONNEL:

T. C. Cartwright, G. F. Ellis, Jr., H. W. Franke and J. K. Riggs - Animal Husbandry Department, Texas A and M; and
H. O. Hill, W. E. Kruse and J. M. Shelton, Texas Agricultural Experiment Station, McGregor, Texas.

IV. ACCOMPLISHMENTS DURING THE YEAR:

Gain data have indicated that calves averaging 1000 lbs. in 365 days or less can be produced if nutritional and management conditions are optimized. The first group of calves testing this assumption were observed during the past year. A group of 33 calves and their dams were split into three groups: control (pasture only), creep, and feedlot (calves stay in feedlot, dams put with them at night and

graze during the day). The calves were all at least six months of age when put in these groups. The treatments had little effect and all calves were weaned and put in the feedlot the last 35 days. More adequate procedures of management will be explored. The test was terminated short of 1000 pound weights due to previous slaughter commitments. The calves were 326 days of age and the average weight was 766 pounds for the control group. The steers sired by either Charolais or Santa Gertrudis averaged 817 pounds at this time. Those sired by either Hereford or Brahman averaged 744 pounds. All were from crossbred Brahman dams. With continued selection, use of Charolais and Santa Gertrudis sires and improved management, these data suggest that the goal set is not unrealistic.

Differences in weight, rate of gain, and level of feed consumption often make interpretations of feed efficiency data difficult. Physical control of one or more of the variables may, at times, be preferable to statistical control. A series of trials have been planned where weight, age and feed consumption will be held as near constant as possible.

In a preliminary trial at McGregor, ten Hereford steer calves were fed individually for 216 days after a preliminary adjustment period of 42 days. Although initial weight was more variable than desired, each animal was fed the same amount of feed each day with the amount set approximately at the level that the least hungry calf would consume. Although there were small differences in total feed consumption, this was eliminated as a major source of variation. Resulting differences in gain, therefore, should be closely related to differences in efficiency of feed use.

Average daily gain ranged from 1.40 to 1.83 pounds while efficiency of feed use varied from 1072 to 822 pounds of feed per 100 pounds gain with all calves consuming essentially equal amounts of feed.

Given equal initial weights, faster gaining calves will have higher maintenance requirements due to higher average body weight while on test. This tends to decrease the amount of nutrients available for gain in weight if all calves are limited to equal amounts of feed. Inspection of the data indicates that some calves with higher average weights while on test (average of initial and final weights) were also the faster gainers and, therefore, the most efficient. This is due at least partially to an automatic relationship between gain and average weight on test. However, the interesting point is that these calves were able to gain at faster rates while also maintaining heavier body weights.

A comparison of the extremes indicates that one calf gained thirty-one percent more than another on essentially the same amount of feed and maintained an average of about fifty-three percent more body weight while doing it.

While the number of steers in this preliminary trial is small, the data indicate definite individual differences in efficiency of feed use even when level of feed consumption is held constant. There is also a suggestion that sire differences may exist. The data are summarized below:

McGregor Feed Efficiency Steers 1961 - 1962

Steer Number	Sire	216-day Gain	Feed per cwt. Gain	Ave. Wt. on Test	Total, Feed Consumption
1084	8029	395	822	801	3245
1105	8808	382	851	698	3252
1029	501	374	840	733	3140
1027	558	366	880	660	3219
1109	501	364	900	705	3277
1130	8808	358	906	616	3244
1028	501	335	950	534	3183
1135	7057	303	1062	549	3218
1129	7057	302	1040	524	3141
1066	501	302	1072	570	3237

In cooperation with the Southwest Agricultural Institute, San Antonio, Texas, estimates of ribeye area and fat thickness over the ribeye obtained by the use of an ultrasonic (u.s.) device were tested for accuracy. The following correlations were obtained on 185 individuals:

X	Y	r	P
Ribeye tracing	u.s. ribeye	.89	< .01
Carcass fat measure	u.s. fat	.74	< .01
Weight of animal	u.s. ribeye	.77	< .01
Weight of animal	u.s. fat	.12	> .05
Weight of Animal	actual fat	.48	< .01
Carcass fat measure	ribeye tracing	-.15*	< .05

*One partial correlation, independent of warm carcass weight.

Before accurate comparisons among estimated ribeye areas of individuals can be made, considerable more work is necessary to establish useful working corrections for effects such as weight, age, sex and the degree of fatness. The ultrasonic estimates of fat thickness were less accurate than ribeye area estimates. Multiple regression studies indicated very little additional accuracy by considering several variables. In this work it appeared that smaller ribeyes tended to be associated with an excess amount of outside fat. This observation is confirmed to a small degree by the negative partial correlation between fat thickness and ribeye area independent of weight.

An equation for adjusting ribeye area for differences in carcass weight of steers was developed from data on 1091 steers collected in several states. A quadratic equation of the form $Y = a + bX + cX^2$ was used where Y = ribeye area and X = warm carcass weight. The inclusion of X^2 significantly reduced the unaccounted for sum of squares.

An equation derived from the resulting estimation equation to adjust to a standard carcass weight of 475 pounds was:

$$\hat{Y}_a = \frac{1.9616}{-\frac{173.9}{\text{warm carcass wt.}} + 3.4381 - .0023377 \text{ (Warm car. wt.)}} \text{ [actual ribeye area]}$$

A table of multiplicative correction factors in five pound warm carcass weight increments to adjust to a 475 carcass basis is given below. Each carcass weight listed represents the lowest value in the five pound class.

Warm Carcass Weight	Adjustment Factor	Warm Carcass Weight	Adjustment Factor	Warm Carcass Weight	Adjustment Factor
475	1.000	555	1.073	635	1.168
480	1.004	560	1.079	640	1.174
485	1.008	565	1.084	645	1.181
490	1.012	570	1.089	650	1.188
495	1.017	575	1.095	655	1.195
500	1.021	580	1.101	660	1.202
505	1.025	585	1.106	665	1.209
510	1.030	590	1.112	670	1.217
515	1.034	595	1.118	675	1.224
520	1.039	600	1.124	680	1.232
525	1.044	605	1.130	685	1.239
530	1.048	610	1.136	690	1.247
535	1.053	615	1.142	695	1.255
540	1.058	620	1.148	700	1.263
545	1.063	625	1.155		
550	1.068	630	1.161		

V. FUTURE PLANS:

Continuation of present research and continued analysis of data which have been collected.

VI. PUBLICATIONS DURING THE YEAR:

Butler, O. D. 1961. Beef Carcass standards for production registry. Invitational paper presented at the 1961 meeting of the American Society of Animal Production.

Butler, O. D., T. C. Cartwright, L. E. Kunkle, F. A. Orts, G. T. King and D. W. Lewter, 1961. Comparative feedlot performance and carcass characteristics of Hereford and Angus steers. Journal of Animal Science (in press).

Bulter, O. D., L. E. Kunkle, F. A. Orts and G. T. King. 1961. Important beef carcass traits easily obtained. Journal of Animal Science, 20:914 (abstract)

Cartwright, T. C. and J. A. Carpenter. 1961. Effects of nursing habits on calf weights. Journal of Animal Science, 20:904 (abstract).

Cartwright, T. C., C. F. Parker and J. A. Carpenter. 1961. Use of data processing equipment for keeping individual beef cattle performance records. Texas Agricultural Experiment Station, M.P. 506.

Cartwright, T. C., D. E. Wideman and J. Morrow. 1961. The value of ultrasonic and other objective measurements in the sale of a group of Angus bulls. Texas Agricultural Experiment Station, Progress Report 2199.

Ellis, G. F., Jr., T. C. Cartwright and J. P. Smith. 1961. Comparative accuracy of weekly and consecutive daily weights of beef cattle. Texas Agricultural Experiment Station, Progress Report 2226.

Thomas, R. C. 1962. Factors affecting feedlot gains of Hereford bulls. Master's Thesis, Texas A and M College Library.

Wythe, L. D., Jr., F. A. Orts and G. T. King. 1961. Bone-muscle relationship in beef carcasses. Journal of Animal Science, 20:3.

PUBLICATIONS PLANNED:

Heterosis in Brahman-Hereford crossbreds.
Environmental-genetic interactions exhibited on different gain test rations.

Submitted by: T. C. Cartwright, and
G. F. Ellis, Jr.

I. PROJECT: 714 (S-10)

Biochemical and Fundamental Physiological Changes Occurring with Genetically Variable Growth of Animals.

II. OBJECTIVES:

To delineate, by quantative and mathematical descriptions, certain basic biochemical and physiological changes as they occur with growth of animals.

To evaluate particularly the phenotypic and genetic correlations of certain variations in biochemical and physiological change to modifications in patterns of postnatal growth.

To develop methods of biochemical or physiological nature which will measure the potential rate of gain and efficiency of feed utilization in young beef animals.

III. ACCOMPLISHMENTS DURING THE YEAR:

The research concerning the relationship of ruminal development to rate of gain has continued. Work has centered on the relationship of the development of the ruminal epithelium to the adaptive metabolic change occurring in ruminant animals. The adaptation is being primarily tested by the physiological response to insulin injection. Results indicate a relationship of chronic insulin-induced hypoglycemia to development of ruminal epithelium. Work has been initiated to determine the effect of age on fermentative patterns within the rumen of lambs and to determine the existence of individual variations in ruminal fermentation when animals received a common diet.

The study of mathematical and theoretical models for the evaluation of growth is being continued. Growth curves, based upon experimental data being obtained from rat growth, are being derived. We have determined that a major component of variance in growth rates and unaccounted for in growth equations is that of compensatory growth. Preliminary studies have been initiated on the analysis of bovine serum protein. Progress in this area has been stymied by an inordinate instability of bovine serum proteins. The effect of age on amino acid patterns in cattle is being studied in connection with Project 959. Distinct pattern differences have been noted in blood of female cattle at one year and two years of age.

IV. FUTURE PLANS:

Work on the development of theoretical and mathematical models for the study of the physiological bases for growth will be continued. The relationship to ruminal development, growth, and the metabolic adaptation of ruminants will be continued. Further efforts will be directed to the analyses of bovine serum proteins.

V. PUBLICATIONS:

Glimp, H. A. 1962. A study of theoretical mathematical models for the quantitative physiological description of mammalian growth. Master's Thesis, Texas A and M College Library.

Kunkel, H. O. 1961. Biochemical and fundamental physiological bases of genetically variable growth of animals. Texas Agricultural Experiment Station, M.P. 499.

Omar, E. M. 1962. The tolerance to insulin as related to the general metabolic adaptation associated with ruminal development in suckling lambs. Master's Thesis, Texas A and M College Library.

VI. PUBLICATIONS PLANNED:

None

Submitted by: H. O. Kunkel

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I. PROJECT: 959 (S-10)

Biochemical and physiological anomalies of bovine dwarfism and their use in detection of heterozygotes.

II. OBJECTIVES:

The detection of biochemical and physiological anomalies which may be associated with bovine dwarfism of various types, with an attempt to identify the metabolic defect(s) which cause the dwarfism.

The determination of the extent to which biochemical and physiological factors which are anomalous in dwarfs vary in normal animals.

The determination of the usefulness of the variation of these factors in distinguishing between normal carriers and non-carriers of the genes conditioning the dwarfism.

The use of these factors in studying further the mode of inheritance of dwarfism in beef cattle.

III. ACCOMPLISHMENTS DURING THE YEAR:

Earlier experiments in which the changes of free glycine, glutamic acid, and histidine in plasma were determined by microbiological techniques indicated that differences in patterns of change with fasting occurred between mature normal cattle and mature dwarfs. The major effort during the past year was the analysis of free amino acids in plasma obtained from six normal heifers and six dwarf heifers which were fasted for an eighty-eight hour period, first at about twelve months of age and again at two years of age. Plasma samples were obtained at four intervals during the fasting period and the free amino acids in the protein-free filtrate of plasma were determined by the Moore and Stein ion-exchange chromatographic procedure. Graphic recordings of chromatographic data have been accomplished for all samples. Reduction of graphic data to numerical data is incomplete. However, the following conclusions can be drawn. Compounds in plasma from both normal and dwarf cattle were: lysine, tryptophan, histidine, phenylalanine, tyrosine, leucine, isoleucine, threonine, methionine, valine, glycine, alanine, serine, crystine, ornithine, arginine, urea and ammonia. A trace of hydroxyproline was detected. The glycine level increased early in the fast approximately two-fold in normal yearling heifers, but the increase was less in dwarf cattle. Alanine gradually decreased in normal cattle, but the change was erratic in dwarf animals.

The evidence obtained in connection with Project 714 indicates that the tolerance to insulin in sheep is dependent upon the age and previous nutritional status of the animals. Extrapolation of these findings to cattle would indicate that previous conclusions - that the dwarfism gene affects the tolerance to insulin - are in error.

IV. FUTURE PLANS:

The continuing study on the plasma free amino acids will be completed and evaluated with particular attention being placed on the moderating effects of age. The relationship of amino acid metabolism to muco-polysaccharide accumulation appears to be the logical subject of subsequent research.

V. PUBLICATIONS DURING THE YEAR:

Brown, H. E., H. O. Kunkel and J. M. Prescott. 1961. Free amino acids of bovine plasma - Identification and effect of fasting. Journal of Animal Science, 20:967 (abstract).

Brown, H. E. 1962. Oxidative metabolism of glucose - G-phosphate in preparations of bovine erythrocyte. Master's Thesis, Texas A and M College Library.

VI. PUBLICATIONS PLANNED:

None

Submitted By: H. O. Kunkel

CATTLE BREED AND CROSS CODE

Breed Code	Breed	Cross Code		Dam Breed		Sire Breed
A	Angus	1x	=	H	-	B
B	Brahman	2x	=	B	-	H
BA	Brangus	3x	=	1x	-	H
BM	Beefmaster	4x	=	1x	-	B
BS	Brown Swiss	9x	=	H	-	1x
C	Charbray	11x	=	H	-	G
G	Santa Gertrudis	13x	=	1x	-	G
H	Hereford	14x	=	1x	-	R
X	Holstein	15x	=	H	-	L
J	Jersey	16x	=	1x	-	L
L	Charolais	23x	=	4x	-	B
R	Red Poll	32x	=	11x	-	G
RA	Red Angus	42x	=	13x	-	G
RB	Red Brangus	51x	=	R	-	G
S	Shorthorn	61x	=	14x	-	G
U	Sussex					

FORM I
1961

COW PRODUCTION CALF CROP

Texas
State

Location	No. 23	No. 23	No. 23			
Breed of sire	Angus	Brahman	Charbray	Hereford	S. Gert.	S. Gert.
Breed of dam	Angus	Brahman	Charbray	Hereford	S. Gert.	Red Poll
Line or group[1]						
No. cows exposed[2]	16	19	36	96	28	8
No. calves born[3]	16	8	19	82	14	4
Calving percent, born	100	42	53	85	50	50
Av. birth date	1/19/61	3/20/61	2/26/61	2/3/61	3/10/61	3/7/61
Av. birth weight	64	69	92	68	77	107
Number calves weaned	16	6	17	73	14	4
Calving percent, weaned[4]	100	32	47	76	50	50
Av. weaning age, days						
Adj. ADG[5]	2.1	2.2	2.7	1.9	2.5	2.5
Av. type score[6]						
Av. condition score						

1 - Purebreds, grade, line, backcross, 3-breed cross, treatment, etc.
2 - Total number put in breeding herd.
3 - Total number born, dead + alive.
4 - Number weaned divided by number of cows exposed.
5 - Indicate adjustments:
6 - 15, 16, and 17 = Fancy
12, 13, and 14 = Choice
9, 10, and 11 = Good
6, 7, and 8 = Medium

Texas (11) FORM I 1961

COW PRODUCTION CALF CROP

Texas Stabo

Location						
Breed of sire	Hereford	2x	Brahman	S. Gert.	2x	Brahman
Breed of dam	Brahman	Brahman	Hereford	Hereford	1x	1x
Line or group[1]						
No. cows exposed[2]	16	15	15	15	16	17
No. calves born[3]	11	10	10	9	13	14
Calving percent, born	69	67	67	53	81	82
Av. birth date	2/7/61	3/7/61	1/22/61	2/4/61	2/6/61	2/19/61
Av. birth weight	64	66	91	82	69	77
Number calves weaned	11	8	9	9	11	9
Calving percent, weaned[4]	69	53	60	53	69	53
Av. weaning age, days						
Adj. ADG[5]	2.4	2.3	2.4	2.2	2.5	2.4
Av. type score[6]						
Av. condition score						

1 - Purebreds, grade, line, backcross, 3-breed cross, treatment, etc.
2 - Total number put in breeding herd.
3 - Total number born, dead + alive.
4 - Number weaned divided by number of cows exposed.
5 - Indicate adjustments:
6 - 15, 16, and 17 = Fancy
12, 13, and 14 = Choice
9, 10, and 11 = Good
6, 7, and 8 = Medium

FORM I 196_

COW PRODUCTION CALF CROP

Texas State

Location						
Breed of sire	Hereford	Charolais	Hereford	Brahman	Hereford	Hereford
Breed of dam	1x	1x	3x	4x	4x	9x
Line or group[1]						
No. cows exposed[2]	17	16	10	28	5	5
No. calves born[3]	13	11	9	17	5	5
Calving percent, born	76	69	90	61	100	100
Av. birth date	2/12/61	2/25/61	2/21/61	3/4/61	2/13/61	1/16/61
Av. birth weight	70	91	74	67	53	85
Number calves weaned	13	9	9	13	4	5
Calving percent, weaned[4]	76	56	90	46	80	100
Av. weaning age, days						
Adj. ADG[5]	2.4	2.7	2.1	2.2	2.2	2.5
Av. type score[6]						
Av. condition score						

1 - Purebreds, grade, line, backcross, 3-breed cross, treatment, etc.
2 - Total number put in breeding herd.
3 - Total number born, dead + alive.
4 - Number weaned divided by number of cows exposed.
5 - Indicate adjustments:
6 - 15, 16, and 17 = Fancy
12, 13, and 14 = Choice
9, 10, and 11 = Good
6, 7, and 8 = Medium

Texas (13)

FORM I

COW PRODUCTION 1961 CALF CROP

Texas State

Location						
Breed of sire	S. Gert.	S. Gert.	Charolais	Charolais	Brahman	S. Gert.
Breed of dam	11x	13x	15x	16x	23x	32x
Line or group[1]						
No. cows exposed[2]	24	9	4	6	11	12
No. calves born[3]	19	5	3	5	6	8
Calving percent, born	79	56	75	83	55	67
Av. birth date	2/4/61	2/18/61	11/24/60	1/3/61	4/2/61	2/26/61
Av. birth weight	82	80	85	82	63	73
Number calves weaned	17	5	2	5	4	7
Calving percent, weaned[4]	71	56	50	83	36	58
Av. weaning age, days						
Av. ADG[5]	2.4	2.4	2.7	2.6	2.0	2.4
Av. type score[6]						
Av. condition score						

1 - Purebred, grade, line, backcross, 3-breed cross, treatment, etc.
2 - Total number put in breeding herd.
3 - Total number born, dead + alive.
4 - Number weaned divided by number of cows exposed.
5 - Indicate adjustments:
6 - 15, [illegible] and 17 = Fancy
12, 13, and 14 = Choice
9, 10, and 11 = Good
6, 7, and 8 = Medium

FOR

COW PRODUCTION, 1961 CALF CROP

	Texas				State	
Location					A-M Plant.	A-M Plant.
Breed of sire	S. Gert.	S. Gert.	S. Gert.	S. Gert.	Hereford	Hereford
Breed of dam	51x	61x	42x	14x	Hereford	Hereford
Line or group[1]					R. O. P.	Commercial
No. cows exposed[2]	12	3	3	2	108	73
No. calves born[3]	5	2	1	2	106	70
Calving percent, born	42	67	34	100	98	96
Av. birth date	3/6/61	3/8/61		1/12/61	11/10/60	10/13/60
Av. birth weight	71	77		107		
Number calves weaned	4	2	0	2	89	51
Calving percent, weaned	33	67		100	82	70
Av. weaning age, days					214	243
Adj. A. D. G.[5]	2.2	2.6		2.8	1.98*	1.78*
Av. type score[6]						
Av. condition score[6]						

1 - Purebreds, grade, line, backcross, 3-breed cross, treatment, etc.
2 - Total number put in breeding herd.
3 - Total number born, dead + alive.
4 - Number weaned divided by number of cows exposed.
5 - Indicate adjustments. *Weight per day of age.
6 - 15, 16 and 17 = Fancy
12, 13 and 14 = Choice
9, 10 and 11 = Good
6, 7 and 8 = Medium

202
Texas (15)

FORM II

POST FEATING PERFORMANCE OF CALVES FED IN 1961

Texas
State

	Location	McGregor	McGregor	McGregor	McGregor	McGregor	McGregor
	Breed of sire	Hereford	Angus	Charolais	Charbray	Brahman	S. Gert.
	Breed of dam	Hereford	Angus	Charolais	Charbray	Brahman	S. Gert.
	Line or group *						
Bulls	No. in group	12	11	4	2	4	2
	Feed regime **						
	Av. init. age.	276	276	284	218	217	196
	Av. init. wt.	569	541	718	549	486	623
	Av. no. da. fed						
	Av. final wt.	959	915	1101	939	807	1008
	ADG on test	2.8	2.7	2.7	2.8	2.3	2.8
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						
Heifers	No. in group						
	Feed regime **						
	Av. init. age						
	Av. init. wt.						
	Av. no. da. fed						
	Av. final wt.						
	ADG on test						
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						
Steers	No. in group						
	Feed regime **						
	Av. init. age						
	Av. init. wt.						
	Av. no. da. fed						
	Av. final wt.						
	ADG on test						
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						

* Show whether station-owned or cooperator-owned, in addition to other group designation.

	Bulls	Steers	Heifers
How fed - full, limited, etc.	Full-fed		
Pounds/day over feeding period			
Ration:			

Texas (16)

FORM II

POST-WEANING PERFORMANCE OF CALVES FED IN 1961

Texas

State

	Location	McGregor	McGregor	McGregor	McGregor	McGregor	McGregor
	Breed of sire	Hereford	S. Gert.	Brahman	Hereford	Brahman	B x H
	Breed of dam	Hereford	S. Gert.	Hereford	Brahman	B x H	Brahman
	Line or group *						
Bulls	No. in group						
	Feed regime **						
	Av. init. age.						
	Av. init. wt.						
	Av. no. da. fed						
	Av. final wt.						
	ADG on test						
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						
Heifers	No. in group	18	6	4	7	5	3
	Feed regime **						
	Av. init. age	289	248	279	264	268	250
	Av. init. wt.	450	504	548	533	523	489
	Av. no. da. fed						
	Av. final wt.	737	818	846	820	812	758
	ADG on test	2.0	2.2	2.2	2.1	2.1	1.9
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						
Steers	No. in group						
	Feed regime **						
	Av. init. age						
	Av. init. wt.						
	Av. no. da. fed						
	Av. final wt.						
	ADG on test						
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						

* Show whether station-owned or cooperator-owned, in addition to other group designation.

	Bulls	Steers	Heifers
How fed - full, limited, etc.			Full-fed
Pounds/day over feeding period			
Ration:			

Texas (17) FORM II

POSTWEANING PERFORMANCE OF CALVES FED IN 1967

Texas State

	Location	McGregor	McGregor	McGregor	McGregor	McGregor	McGregor
	Breed of sire	B x H	Hereford	Hereford	Hereford	Hereford	B x H
	Breed of dam	B x H	B x H	3x x 9x	Angus	4x x 23x	Hereford
	Line or group *						
Bulls	No. in group						
	Feed regime **						
	Av. init. age						
	Av. init. wt.						
	Av. no. da. fed						
	Av. final wt.						
	ADG on test						
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						
Heifers	No. in group	4	5	9	1	2	4
	Feed regime **						
	Av. init. age	270	279	261	333	239	258
	Av. init. wt.	552	518	509	613	491	447
	Av. no. da. fed						
	Av. final wt.	838	814	814	933	751	739
	ADG on test	2.0	2.1	2.2	2.3	1.9	2.1
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						
Steers	No. in group						
	Feed regime **						
	Av. init. age						
	Av. init. wt.						
	Av. no. da. fed						
	Av. final wt.						
	ADG on test						
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						

* Show whether station-owned or cooperator-owned, in addition to other group designation.

	Bulls	Steers	Heifers
How fed - full, limited, etc.			Full-fed
Pounds/day over feeding period			
Ration:			

FORM II
POST-WEANING PERFORMANCE OF CALVES FED IN 1961

Texas — State

Location		McGregor	McGregor	McGregor	McGregor	McGregor	McGregor
Breed of sire		S. Gert.	Charbray	Hereford	Angus	Charbray	Brahman
Breed of dam		Red Poll	B x H	Hereford	Angus	Charbray	Brahman
Line or group *							
Bulls	No. in group						
	Feed regime **						
	Av. init. age.						
	Av. init. wt.						
	Av.no.da.fed						
	Av. final wt.						
	ADG on test						
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						
Heifers	No. in group	1	1				
	Feed regime **						
	Av. init. age	260	238				
	Av. init. wt.	566	540				
	Av. no. da. fed						
	Av. final wt.	853	865				
	ADG on test	2.1	2.3				
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						
Steers	No. in group			17	1	1	1
	Feed regime **						
	Av. init. age			275	290	197	265
	Av. init. wt.			518	463	575	482
	Av. no. da. fed						
	Av. final wt.			805	774	867	788
	ADG on test			2.0	2.2	2.1	2.2
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						

* Show whether station-owned or cooperator-owned, in addition to other group designation.

	Bulls	Steers	Heifers
How fed - full, limited, etc.		Full-fed	Full-fed
Pounds/day over feeding period			
Ration:			

Texas (19)

FORM II

POST FATTENING PERFORMANCE OF CALVES FED IN 1961

Texas State

	Location	McGregor	McGregor	McGregor	McGregor	McGregor	McGregor
	Breed of sire	Hereford	Angus	Charolais	Chrabray	Brahman	Brahman
	Breed of dam	Hereford	Angus	Charolais	Charbray	Brahman	4x
	Line or group *						
Bulls	No. in group						
	Feed regime **						
	Av. init. age.						
	Av. init. wt.						
	Av.no.da.fed						
	Av. final wt.						
	ADG on test						
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						
Heifers	No. in group	41	2	5	5	1	9
	Feed regime **						
	Av. init. age	304	307	284	271	245	235
	Av. init. wt.	452	494	560	600	383	349
	Av. no. da. fed						
	Av. final wt.	681	692	797	822	540	524
	ADG on test	1.6	1.4	1.7	1.6	1.1	1.3
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						
Steers	No. in group						
	Feed regime **						
	Av. init. age						
	Av. init. wt.						
	Av. no. da. fed						
	Av. final wt.						
	ADG on test						
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						

* Show whether station-owned or cooperator-owned, in addition to other group designation.

	Bulls	Steers	Heifers
How fed - full, limited, etc.			Limited
Pounds/day over feeding period			
Ration:			

FORM II
POST-WEANING PERFORMANCE OF CALVES FED IN 1961

Texas — State

	Location	McGregor	McGregor	McGregor	McGregor	McGregor	McGregor
	Breed of sire	Brahman	S. Gert.	S. Gert.	S. Gert.	S. Gert.	S. Gert.
	Breed of dam	23x	11x	32x	13x	51x	61x
	Line or group *						
Bulls	No. in group						
	Feed regime **						
	Av. init. age.						
	Av. init. wt.						
	Av.no.da.fed						
	Av. final wt.						
	ADG on test						
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						
Heifers	No. in group	3	12	3	4	2	1
	Feed regime **						
	Av. init. age	211	268	248	250	254	260
	Av. init. wt.	381	486	421	465	475	528
	Av. no. da. fed						
	Av. final wt.	563	710	661	712	668	766
	ADG on test	1.3	1.6	1.7	1.8	1.4	1.7
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						
Steers	No. in group						
	Feed regime **						
	Av. init. age						
	Av. init. wt.						
	Av. no. da. fed						
	Av. final wt.						
	ADG on test						
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						

* Show whether station-owned or cooperator-owned, in addition to other group designation.

	Bulls	Steers	Heifers
How fed - full, limited, etc.			Limited
Pounds/day over feeding period			
Ration:			

FORM II

STEER FEEDING PERFORMANCE OF CALVES FED IN ...

Texas State

	Location	McGregor	McGregor	McGregor	McGregor	McGregor	
	Breed of sire	Charolais	Charolais	Charbray	Charbray	Charolais	
	Breed of dam	B x H	15x	3x x 9x	16x	16x	
	Line or group *						
Bulls	No. in group						
	Feed regime **						
	Av. init. age.						
	Av. init. wt.						
	Av.no.da.fed						
	Av. final wt.						
	ADG on test						
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						
Heifers	No. in group	3	2	2	1	2	
	Feed regime **						
	Av. init. age	266	342	204	209	350	
	Av. init. wt.	561	686	406	493	630	
	Av. no. da. fed						
	Av final wt.	799	955	681	680	886	
	ADG on test	1.7	2.0	2.0	1.3	1.9	
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						
Steers	No. in group						
	Feed regime **						
	Av. init. age						
	Av. init. wt.						
	Av. no. da. fed						
	Av. final wt.						
	ADG on test						
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						

* Show whether station-owned or cooperator-owned, in addition to other group designation.

	Bulls	Steers	Heifers
How fed - full, limited, etc.			Limited
Pounds/day over feeding period			
Ration:			

FORM II
POSTWEANING PERFORMANCE OF CALVES FED IN 1961

Texas State

	Location	McGregor	McGregor	McGregor	McGregor	McGregor	McGregor
	Breed of sire	Hereford	Brahman	B x H	B x H	Brahman	Brahman
	Breed of dam	Brahman	B x H	Brahman	B x H	4x	23x
	Line or group *						
Bulls	No. in group						
	Feed regime **						
	Av. init. age.						
	Av. init. wt.						
	Av.no.da.fed						
	Av. final wt.						
	ADG on test						
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						
Heifers	No. in group						
	Feed regime **						
	Av. init. age						
	Av. init. wt.						
	Av. no. da. fed						
	Av. final wt.						
	ADG on test						
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						
Steers	No. in group	2	3	5	1	2	1
	Feed regime **						
	Av. init. age	252	264	231	223	229	213
	Av. init. wt.	590	584	500	437	520	431
	Av. no. da. fed						
	Av. final wt.	922	891	812	708	846	755
	ADG on test	2.4	2.2	2.2	1.9	2.4	2.3
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						

* Show whether station-owned or cooperator-owned, in addition to other group designation.

	Bulls	Steers	Heifers
How fed - full, limited, etc.		Full-fed	
Pounds/day over feeding period			
Ration:			

Texas (23)

FORM II

Texas State

	Location	McGregor	McGregor	McGregor	McGregor	McGregor	McGregor
	Breed of sire	Hereford	Hereford	B x H	S. Gert.	S. Gert.	S. Gert.
	Breed of dam	3x X 9x	4x X 23x	Hereford	11x	32x	Red Poll
	Line or group *						
Bulls	No. in group						
	Feed regime **						
	Av. init. age.						
	Av. init. wt.						
	Av.no.da.fed						
	Av. final wt.						
	ADG on test						
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						
Heifers	No. in group						
	Feed regime **						
	Av. init. age						
	Av. init. wt.						
	Av. no. da. fed						
	Av. final wt.						
	ADG on test						
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						
Steers	No. in group	2		2	2	2	1
	Feed regime **						
	Av. init. age	246	284	300	264	236	188
	Av. init. wt.	491	525	585	596	591	508
	Av. no. da. fed						
	Av. final wt.	763	818	921	993	999	833
	ADG on test	2.0	2.1	2.4	2.9	2.9	2.3
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						

* Show whether station-owned or cooperator-owned, in addition to other group designation.

	Bulls	Steers	Heifers
How fed - full, limited, etc.		full-fed	
Pounds/day over feeding period			
Ration:			

FORM II

Texas (24)

1961

Texas — State

	Location						
	Breed of sire	McGregor	McGregor	McGregor	McGregor	McGregor	McGregor
	Breed of dam	S. Gert.	S. Gert.	Charbray	Charbray	Hereford	Hereford
	Line or group *	51x	61x	B x H	16x	Hereford	B x H
Bulls	No. in group						
	Feed regime **						
	Av. init. age.						
	Av. init. wt.						
	Av.no.da.fed						
	Av. final wt.						
	ADG on test						
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						
Heifers	No. in group						
	Feed regime **						
	Av. init. age						
	Av. init. wt.						
	Av. no. da. fed						
	Av. final wt.						
	ADG on test						
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						
Steers	No. in group	1	1	2	1	6	3
	Feed regime **						
	Av. init. age	174	214	234	235	274	227
	Av. init. wt.	384	516	545	579	440	578
	Av. no. da. fed						
	Av. final wt.	688	771	856	853	678	787
	ADG on test	2.2	1.8	2.2	2.0	1.7	1.5
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						

* Show whether station-owned or cooperator-owned, in addition to other group designation.

	Bulls	Steers	Heifers
How fed - full, limited, etc.		Full-fed	
Pounds/day over feeding period			
Ration:			

Texas (25)

FORM II

POSTWEANING PERFORMANCE OF CALVES FED IN 1961

Texas State

Location		A and M					
Breed of sire		Hereford					
Breed of dam		Hereford					
Line or group *							
Bulls	No. in group						
	Feed regime **						
	Av. init. age						
	Av. init. wt.						
	Av.no.da.fed						
	Av. final wt.						
	ADG on test						
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						
Heifers	No. in group						
	Feed regime **						
	Av. init. age						
	Av. init. wt.						
	Av. no. da. fed						
	Av. final wt.						
	ADG on test						
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						
Steers	No. in group	66					
	Feed regime **						
	Av. init. age	303					
	Av. init. wt.	557					
	Av. no. da. fed	186					
	Av. final wt.	979					
	ADG on test	2.27					
	Av. type sc.	Choice					
	Av. cond. sc.						
	Av. inbreeding	x					

* Show whether station-owned or cooperator-owned, in addition to other group designation.

	Bulls	Steers	Heifers
How fed - full, limited, etc.		Full-fed	
Pounds/day over feeding period			
Ration:		Protein supp. = 2.0 lbs. Gr. sorghum grain=12.6 lbs. Haylage =16.0 lbs.	

FORM III

SLAUGHTER DATA, 1961

	Texas					State
Location	A and M Plantation					
Breed of sire	Hereford					
Breed of dam	Hereford					
Line or group						
Sex	Steer					
Age at slaughter	492					
No. slaughtered	66					
Days in feedlot	186					
Final feedlot wt.	979					
Slaughter wt.,live	917					
Carcass wt., cold	552					
Dressing percent, cold	61					
Carcass grade, quality	Good					
Carcass grade, cutability						
Estimated percent, kidney fat	3.12					
Ribeye area/100 lbs. carcass	1.60					
Marbling score						
Fat thickness over ribeye*	.63					
W-B shear force, pounds**	9.11					

* Use one measure - if not, indicate method

** Indicate size of core used and how meat was cooked.

One-half inch core from cuts one inch thick; 80° oven temperature

Virginia Polytechnic Institute
Agricultural Experiment Station

I. PROJECT: S-031-8 (S-10)

Evaluation of the Effectiveness of Selection for Economic Traits in Beef Cattle.

II. OBJECTIVES:

To obtain estimates of genetic parameters from field data to include:
a. heritability and repeatability of traits;
b. phenotypic and genetic correlations;
c. proper weighting of traits in a selection index.

To study the effects of location on performance records.

To re-evaluate (and possibly identify others) the constants now being used in the Virginia BCIA program in correcting for non-genetic differences.

To study the relationship of mature weight of herd sires and dams to the performance of their offspring.

To determine the minimum postweaning gains required to obtain measurable genetic differences among animals.

To study the relationship among live animal measurements, type ratings, and growth rates.

To evaluate the effectiveness of selection on the improvement of beef cattle under farm conditions.

III. ACCOMPLISHMENTS DURING THE YEAR:

Progress was made during the year toward accomplishing objectives two, three and four. A cooperative study by the Texas and Virginia stations to get some estimate of the location effects on performance was started. Four geographical locations were selected within each of the two states. BCIA data gathered over the four-year period from 1956 through 1959 were used. Multiple regression and the use of matrix arithmetic were used to estimate the influence of location when year, age of dam, sex, and age of calf effects were held constant. Location had a significant influence on the performance records; however, our study to date sheds no light on whether or not the same growth adjustment factors are applicable in the different locations. The foregoing pertains to the second objective.

Third objective - The growth adjustments factors (GAF) published by Marlowe and Gaines (1958) have been used to adjust all calf records in the Virginia BCIA program. They were recently summarized by (1) age

of calf, (2) sex of calf, (3) month of birth, and (4) age of dam to check their effectiveness in adjusting for these effects. They appear to have done an excellent job as far as age of dam is concerned and a reasonably good job for the sex of calf; however, they are rather inadequate for month of birth. This summary also confirms our earlier opinion that there is little to be gained by adjusting for age of calf when calves are indexed within the recommended age limits of 150-240 days.

Fourth objective - Last year's report covered a study of the factors that influence the weight and grade of cows and bulls. The factors studied included age, flesh condition, season, and nursing status of the cows. The constants obtained in that study were used to adjust weights and grades of sires and dams of the calves tested in the Virginia BCIA program to a common base in order that their weights and grades could be related to the performance of their offspring. Sire-offspring estimates were within herd performance level, managmment practice and year. The weight relationships were estimated as r = .22 and .30 and b = .0028 and .0041 for Angus and Herefords, respectively. Dam-offspring estimates were on a within sire, herd, management practice and year basis. r = .23 and .20 for weight for Angus and Herefords, respectively. Corresponding b values were .0061 and .0052. For grade r = .09 for Angus and .12 for Herefords; b = .10 and .15, respectively.

Adjusted average weights and grades of beef bulls and cows were obtained on large numbers of animals and are shown by age and breed in Tables 14 and 15 of Virginia Experiment Station bulletin 537.

IV. FUTURE PLANS:

Work will be continued in accordance with the objectives listed above with major emphasis on the first two objectives during the coming year.

V. PUBLICATIONS DURING THE YEAR:

Marlowe, T. J., R. J. Freund and J. B. Grahman. 1962. Influence of age, breed, flesh condition, nursing and season on weight and grade of beef cattle. Journal of Animal Science (in press).

Marlowe, T. J. 1962. Weights and grades of beef cattle and their relation to performance. Virginia Agricultural Experiment Station bulletin 537.

VI. PUBLICATIONS PLANNED:

An article on the effects of location on performance records.

Submitted by T. J. Marlowe

I. PROJECT: Hatch 93901, AHRD Line Project d1-7 (S-10)

Heterosis from Crosses Among British Breeds of Beef Cattle.

II. OBJECTIVES:

To measure heterosis obtained from crosses among Angus, Hereford and Shorthorn beef cattle as shown by growth rate, fattening ability and carcass quality up to approximately two years of age.

To measure productive ability of crossbred vs. purebred dams.

III. PERSONNEL:

R. C. Carter, J. S. Copenhaver, J. A. Gaines, W. H. McClure and D. W. Vogt

IV. ACCOMPLISHMENTS DURING THE YEAR:

This report summarizes the results obtained to date. The fifth and final calf crop in the first phase of the experiment (first objective) was weaned in October, 1961. Four-year summaries of performance and slaughter data for steers and heifers are presented in Tables 1 and 2, respectively. Calving percentages based on the five calf crops are presented in Table 3. Post-weaning performance and slaughter data for the fourth calf crop are shown in Forms 2 and 3, respectively. A summary concerning the cow herd bred in 1960 and calving in 1961 (fifth calf crop) is given in Form 1.

The second phase of the project (second objective) was initiated in May, 1962, One hundred and twenty purebred (Angus, Hereford and Shorthorn) and two-breed cross heifers (Angus-Hereford, Angus-Shorthorn, and Hereford-Shorthorn) have been divided into six equal breeding groups. Three purebred and three crossbred bulls (one to a breeding group) are being used. Assignment of heifers to breeding groups has been made in such a manner that only three-breed and back-cross progeny will be produced. Comparison of progeny produced by purebred vs. crossbred females should permit an estimate of heterosis in maternal effects.

TABLE 1. Four-Year Summary Based on 186 Steers

	Purebred	2-Breed Cross	3-Breed Cross	Back-Cross	Total or Mean
Number weaned	41	46	46	53	186
Birth weight	68	70	69	69	69
Weaning weight	398	411	432	409	413
Feeder grade at weaning	11.3	11.1	10.8	11.0	11.0
ADG, birth to weaning	1.60	1.64	1.64	1.59	1.62
ADG on full feed	2.17	2.16	2.12	2.16	2.15
Slaughter weight	1058	1103	1113	1064	1084
Slaughter grade	11.3	11.5	11.3	11.2	11.3
Carcass grade	11.1	11.3	11.2	11.0	11.1
Carcass weight	632	662	669	637	650
Dressing percent	59.8	60.1	60.0	59.9	60.0
Loin eye area	10.4	11.2	11.2	10.8	10.9

TABLE 2. Four-Year Summary Based on 203 Heifers

	Purebred	2-Breed Cross	3-Breed Cross	Back-Cross	Total or Mean
Number weaned	46	56	49	52	203
Birth weight	65	69	66	66	67
Weaning weight	365	381	404	381	383
Feeder grade at weaning	11.2	10.8	11.1	10.4	10.9
ADG, birth to weaning	1.48	1.56	1.54	1.53	1.53
ADG on full feed	1.75	1.79	1.81	1.85	1.80
Slaughter weight	744	765	798	785	773
Slaughter grade	11.9	11.9	12.3	12.2	12.1
Carcass grade	11.9	12.2	12.1	11.9	12.0
Carcass weight	440	453	475	465	458
Dressing percent	59.1	59.1	59.5	59.1	59.2
Loin eye area	8.6	8.8	9.5	9.4	9.1

TABLE 3. Calving Percentages Based on Five Calf Crops

	Purebred	2-Breed Cross	3-Breed Cross	Back-Cross	Total or Mean
Number of matings	145	142	141	145	143
Number of calves weaned	110	125	117	127	120
Percent weaned	76	88	83	88	84

V. FUTURE PLANS:

Data obtained in Phase I will be analyzed after the fifth calf crop steers are slaughtered in January, 1963.

Fifth calf crop heifers will be slaughtered in May, 1962.

Phase II will proceed as outlined.

VI. PUBLICATIONS DURING THE YEAR:

Gaines, J. A., W. H. McClure, R. C. Carter and C. M. Kincaid. 1961. Crossing three British breeds of beef cattle. Journal of Animal Science, 20:906.

VII. PUBLICATIONS [illegible]:

None

Submitted by: D. W. Vogt

* * * * *** * * * *

Northern Virginia Pasture Research Station, Middleburg, Virginia:

The Northern Virginia Pasture Research Station maintains a herd of approximately sixty purebred Angus cows and four herd sires. The cows are bred to calve during the summer in order that they may be weaned in March and the entire calf crop used for grazing tests on the station. Of the sixty-six cows bred in the fall of 1960, sixty-five cows dropped sixty-six calves and weaned fifty-nine calves. There were thirty-five males and thirty females over a calving season of fifty-four days. Their average birth date was July 21, 1961. Their average birth weight was sixty-two pounds, average age at weaning was 248 days, average weaning weight 470 pounds, and average grade was 11.6. The performance of their offspring by sire groups is shown in Table 1. Only two of the sixty-six cows are inbred, and their coefficient of inbreeding is only 6.25 percent.

TABLE 1. Preweaning Performance of 1961 Calves by Sire Groups

Sire No.	No. Off-spring	Age in Days	Weaning Weight	Adjusted A. D. G.	Type Score	Index Value
208	12	246	498	2.03	11.3	119
384	11	253	454	1.84	12.1	116
405*	13	244	453	1.89	11.7	116
R71	2	265	542	2.07	11.5	123
WA22	12	252	463	1.81	11.3	111

*Sire 405 is a son of WA22 and the sire of 208.

Unfortunately, Sire 208 broke a leg and had to be butchered during the year. He dressed 1195 pounds and was three years old. Sires R71 and 384 have also left the herd.

These cattle were used in grazing tests starting shortly after weaning. The performance on pasture for a 179-day period without supplemental feed is shown in Table 2.

TABLE 2. Postweaning Performance on Pasture by Sex and Sire Group

Herd No.	Sire No.	Sex*	Feed Level	No. of Animals	Final Weight	Total Gain	Days on Test	A.D.G.	Type Score
1018	208	2	7	5	634	145	179	81	118
1018	208	3	7	7	672	168	179	94	106
1018	405	2	7	10	587	143	179	80	105
1018	405	3	7	3	655	170	179	95	113
1018	384	2	7	5	601	139	179	78	114
1018	384	3	7	7	604	165	179	92	111
1018	R71	1	7	1	1060	368	179	206	120
1018	R71	2	7	2	692	150	179	84	120
1018	WA22	2	7	4	560	131	179	73	105
1018	WA22	3	7	8	634	154	179	86	113

*Sex: 1 = bulls, 2 = heifers, 3 = steers.

Submitted by: T. J. Marlowe and
R. C. Hammes, Jr.

FORM I

COW-PRODUCTION 1961 CALF CROP

Virginia State

Location	Middleburg	Steeles Tavern	Steeles Tavern	Steeles Tavern	Steeles Tavern	
Breed of sire	Angus	*	*	*	*	
Breed of dam	Angus	*	*	*	*	
Line or group[1]		Purebred	2-breed cross	3-breed cross	back-cross	
No. cows exposed[2]	66	28	25	29	29	
No. calves born[3]	66	25	25	24	24	
Calving percent, born	100	89	100	83	83	
Av. birth-date	7/21/61	3/22/61	3/22/61	3/25/61	4/1/61	
Av. birth weight	62	68	72	75	76	
Number calves weaned	59	24	24	23	22	
Calving percent, weaned[4]	89	86	96	79	76	
Av. weaning age, days	248	198	198	195	188	
Adj. ADG[5]	1.65	1.76	1.84	1.81	1.80	
Av. type score[6]	11.6	12.4	12.5	12.0	12.5	
Av. condition score	8.5					

1 - Purebreds, grade, line, backcross, 3-breed cross, treatment, etc.
2 - Total number put in breeding herd.
3 - Total number born, dead + alive.
4 - Number weaned divided by number of cows exposed.
5 - Indicate adjustments:
6 - 15, 16, and 17 = Fancy
12, 13, and 14 = Choice
9, 10, and 11 = Good
6, 7, and 8 = Medium

* Purebreds were Angus, Hereford and Shorthorn. First crosses were A x H, H x A, A x S, S x A, H x S and S x H. Three-breed crosses were HS x A, AS x H and AH x S. Backcrosses were AH x A, AH x H, AS x A, AS x S, SH x S and SH x H. AH, AS and HS were crossbred (F_1) bulls.

FORM II

FEEDLOT PERFORMANCE OF CATTLE FED IN 1961

Virginia State

	Location	Steeles Tavern					
	Breed of sire	see footnote (1)					
	Breed of dam	see footnote (1)					
	Line or group *	Purebred	2-Br. Cr.	3-Br.Cr.	Backcr.		
Bulls	No. in group						
	Feed regime **						
	Av. init. age.						
	Av. init. wt.						
	Av.no.da.fed						
	Av. final wt.						
	ADG on test						
	Av. type sc.						
	Av. cond. sc.						
	Av. inbreeding						
Heifers	No. in group	10	19	14	12		
	Feed regime **						
	Av. init. age	198	195	215	211		
	Av. init. wt.	396	412	422	423		
	Av. no. da. fed	205	205	205	205		
	Av. final wt.	748	776	787	789		
	ADG on test	1.72	1.78	1.78	1.79		
	Av. type sc.	12.8	11.2	11.2	11.9		
	Av. cond. sc.						
	Av. inbreeding	0	0	0	0		
Steers	No. in group	9	10	12	15		
	Feed regime **						
	Av. init. age	200	204	213	214		
	Av. init. wt.	432	457	460	429		
	Av. no. da. fed	119	119	119	119		
	Av. final wt.	1067	1094	1092	1052		
	ADG on test	2.10	1.98	1.95	2.11		
	Av. type sc.	12.1	12.3	11.6	11.3		
	Av. cond. sc.						
	Av. inbreeding	0	0	0	0		

* Show whether station-owned or cooperator-owned, in addition to other group designation.

	Bulls	Steers	Heifers
How fed - full, limited, etc.		Full-fed	Full-fed
Pounds/day over feeding period			
Ration:			

(1) Purebreds were Angus, Hereford and Shorthorn. First crosses were A x H, H x A, A x S, S x A, H x S and S x H. Three-breed crosses were HS x A, AS x H and AH x S. Backcrosses were AH x A, AH x H, AS x A, AS x S, SH x S and SH x H. AH, AS and HS were crossbred (F_1) bulls.

Va. (9)

FORM III

SLAUGHTER DATA, 1961

	Virginia					State
Location	Middleburg	Middleburg	Middleburg			
Breed of sire	Angus	Angus	Hereford			
Breed of dam	Angus	Angus	Hereford			
Line or group						
Sex	Steer	Steer	Steer			
Age at slaughter	20 mo.	33 mo.	30 mo.			
No. slaughtered	27	9	18			
Days in feedlot	154	154	154			
Final feedlot wt.	902	1187	1111			
Slaughter wt., live	867	1137	1077			
Carcass wt., cold	509	679	618			
Dressing percent, cold	58.70	59.71	57.38			
Carcass grade, quality	10.8	13.4	10.9			
Carcass grade, cutability						
Estimated percent, kidney fat						
Ribeye area/100 lbs. carcass	1.96	1.78	1.67			
Marbling score	5.3	7.1	4.5			
Fat thickness over ribeye*	0.7	1.1	0.9			
W-B shear force, pounds**						

* Use one measure - if not, indicate method

** Indicate size of core used and how meat was cooked.

I. PROJECT: AH 150.16, AHRD Line Project d1-4 (S-10)

The Improvement of Beef Cattle for Virginia Through Breeding Methods

II. OBJECTIVES:

Beef cattle research projects are conducted with three breeds of cattle (Angus, Hereford and Shorthorn) and are associated with problems relating to the improvement of beef cattle for Virginia through breeding methods. The objectives of the investigation are as follows:

To estimate the progress to be expected from mass selection as compared with family selection in the improvement of beef cattle.

To evaluate selection criteria and procedures and develop more precise and effective measures of quality and performance in beef cattle.

To simplify methods of progeny or sib testing whereby breeding cattle can be evaluated at comparatively young ages.

The long-term breeding program for the work at Front Royal may be roughly sub-divided into five phases, each of which has some direct bearing on the main objectives stated above:

(1) Test from weaning to yearling age those bull calves which appear to be herd-sire prospects on the basis of their pre-weaning performance.

(2) Progeny test as yearlings those bulls with favorable records from Phase 1.

(3) Choose as foundation sires those bulls with good records from Phases 1 and 2. Obtain 32 daughters by each foundation sire and out of unrelated cows.

(4) Allot 32 daughters from each foundation sire as follows: Sixteen are placed back with their sire to form an inbred line; eight become part of a growth herd where selection emphasis is on growth; and eight become part of a type herd where selection empahsis is on type. For each breeding plan, measure the progress in terms of changes in growth rate and conformation. Compare the actual results with those expected from theoretical considerations.

(5) Test inbred lines for combining ability and outcross performance.

III. PERSONNEL:

B. M. Priode, Superintendent, Beef Cattle Research Station, Front Royal, Virginia; and K. P. Bovard, Associate Professor of Animal Husbandry, VAES, VPI, Beef Cattle Research Station, Front Royal, Virginia.

IV. ACCOMPLISHMENTS DURING THE YEAR:

The scope and nature of the project have remained essentially unchanged since its inception. Calves from inbred lines are now relatively more highly inbred than in earlier years. Also, mild inbreeding (< 10%) has occurred in the Angus and Shorthorn selection herds as a consequence of the finite sample size from which the bulls were chosen.

Research results:

a. Post-weaning test gains of ninety-four bulls group-fed in lots of about twelve head, each, in 1960 and 1961 were .39 lb./day higher than those of 501 bulls individually fed from 1950-1959. It appears, therefore, that within reasonable limits, "togetherness" is profitable in handling cattle.

b. Effects of inbreeding:
(1) As shown in Table 1 for each sex, intra-sire regressions on Fx for birth weight, average daily gains to midsummer and average daily gains to weaning indicate - at least in this sample - that inbreeding effects are more detrimental to females than to males. Data are from calves born in 1961.

TABLE 1.

	Birth Weight		Daily Gain to Midsummer		Daily Gain to Weaning	
	Female	Male	Female	Male	Female	Male
ANGUS:						
Inbred Lines						
N (no. calves)	18	16	15	15	15	14
Ave. Fx (%)	26	26	27	26	27	26
Ave. Wt. or Gain	61.4	63.7	1.67	1.71	1.62	1.81
Selection Herds						
N	14	16	12	12	12	12
Ave. Fx (%)	2	3	2	2	2	2
Ave. Wt. or Gain	65.2	66.8	1.82	1.96	1.71	2.09
Within-sire regression (b)	-.34	-.15	-.019	+.003	-.018	-.008
Standard error (s_b)	±.08	±.11	±.011	±.009	±.009	±.009
SHORTHORN:						
Inbred Lines						
N	11	12	10	5	10	5
Ave. Fx (%)	30	31	29	29	29	29
Ave. Wt. or Gain	71.8	75.2	1.57	1.57	1.43	1.60
Selection Herds						
N	15	20	15	13	15	13
Ave. Fx (%)	2	3	2	2	2	2
Ave. Wt. or Gain	68.9	74.2	1.48	1.58	1.38	1.58
Within-sire regression (b)	-.73	-.58	-.021	.026	-.017	-.007
Standard error (s_b)	±.44	±.45	±.015	±.018	±.011	±.019

(2) 1961 estimated conception rate - Data below taken from the 1961 breeding herds show a large, but statistically non-significant, effect of inbreeding of fetus and of cow upon conception. Analysis of similar data since 1950 is planned.

TABLE 2.

	N	F of fetus (%)	F of cow (%)	Age of cow
ANGUS:				
Pregnant	137	11.8	6.5	4.3
Open	22	17.3	10.3	3.0
σ within sires		±6.7	±7.0	±1.8
Within-sire regressions (b)		-.00036	-.00156	+.01377
Standard error (s_b)		.00441	.00449	.01750
SHORTHORN:				
Pregnant	126	14.7	9.0	4.3
Open	20	21.0	10.9	4.3
σ within sires		±6.0	±7.0	±1.4
Within-sire regressions (b)		-.00412	-.00071	-.04068
Standard error (s_b)		.00677	.00552	.02396

c. The effect of normal fill upon the accuracy of estimating (1) individual bulls' gains and (2) differences among bulls has been investigated with ROP bulls. Shrink was defined as withholding water overnight. Alternate "shrunk" and "full" weights were obtained at bi-weekly intervals. Some results appear in Table 3.

TABLE 3.

Year-Season	Treatment	Date	No. Bulls	Average Weights 7:00 a.m.	1:00 p.m.
1960-61	Overnight shrink	2/22/61	49	804	830
	No shrink	3/8/61	49	857	864
1961-62	Overnight shrink	10/18/61	44	534	561
	No shrink	11/1/61	44	586	597

V. FUTURE PLANS:

Beginning in January 1962, all calves will be weighed at monthly intervals.

VI. PUBLICATIONS DURING THE YEAR:

Bovard, K. P. and B. M. Priode. 1961. Effects of stage of estrus, and other factors, upon conception rate in beef cows bred artificially. Virginia Academy of Science, May 12, 1961 (abstract).

Bovard, K. P., B. M. Priode, G. E. Whitmore and A. J. Ackerman. 1961. DDT residues in the internal fat of beef cattle fed contaminated apple pomace. Journal of Animal Science, 20:824-826.

Flock, D. K., R. C. Carter, J. A. Gaines and B. M. Priode. 1961. Predicting weaning traits from birth observations in beef calves. Journal of Animal Science, 20:905-906

Putnam, P. A., K. P. Bovard and B. M. Priode. 1961. Volatile fatty acids in the rumen liquor of bulls on record of performance tests. Journal of Animal Science, 20:198 (abstract).

Wiltbank, J. N., E. J. Warwick, E. H. Vernon and B. M. Priode. 1961. Factors affecting net calf crop in beef cattle. Journal of Animal Science, 20:409-416.

VII. PUBLICATIONS PLANNED:

Conception rates in beef cows as affected by inbreeding of fetus and by age and inbreeding of cow.

Station Progress Report dealing with development of project since 1949.

A history of Vibriosis in a herd of experimental beef breeding cattle.

Submitted by: B. M. Priode and
K. P. Bovard

FORM I

Va., F.R. (5)

COW-~~PRODUCTION~~ 1961 CALF CROP

Front Royal, Virginia State

Location						
Breed of sire	Angus	Angus	Angus	Angus	Angus	Angus
Breed of dam	Angus	Angus	Angus	Angus	Angus	Angus
Line or group[1]	1166-A1	057-A2	8150-A3	890-A4	8184-A7	9811-A7
No. cows exposed[2]	20	22	14	16	17	14
No. calves born[3]	10	12	4	8	7	2
Calving percent, born	50	55	29	50	41	14
Av. birth date	2/10/61	3/3/61	2/9/61	3/20/61	1/22/61	4/2/61
Av. birth weight	63	56	56	68	59	63
Number calves weaned	9	11	3	6	6	2
Calving percent, weaned[4]	45	50	21	38	35	14
Av. weaning age, days	212	192	234	178	226	182
Adj. ADG[5]	2.02	1.82	1.54	1.58	1.96	1.90
Av. type score[6]	11.2	10.9	10.4	9.4	12.9	11.2
Av. condition score	10.0	9.0	9.2	8.1	10.8	9.2

1 - Purebreds, grade, line, backcross, 3-breed cross, treatment, etc.
2 - Total number put in breeding herd.
3 - Total number born, dead + alive.
4 - Number weaned divided by number of cows exposed.
5 - Indicate adjustments:
6 - 15, 16, and 17 = Fancy
12, 13, and 14 = Choice
9, 10, and 11 = Good
6, 7, and 8 = Medium

Age of dam:
Age of calf:
Sex of calf:
Other:

Va., F. E. (C) FORM I

COW-PRODUCTION 1961 CALF CROP

Front Royal, Virginia State

Location						
Breed of sire	Angus	Angus	Hereford	Hereford	Hereford	Hereford
Breed of dam	Angus	Angus	Hereford	Hereford	Hereford	Hereford
Line or group[1]	8044-A8	9802-A8	9157-H2	373-H3	8801-H4	0806-H9
No. cows exposed[2]	27	12	8	9	119	13
No. calves born[3]	13	8	2	4	56	6
Calving percent, born	48	67	25	44	47	46
Av. birth date	2/21/61	3/19/61	4/23/61	3/3/61	3/21/61	3/12/61
Av. birth weight	64	74	69	67	69	73
Number calves weaned	10	6	2	4	48	6
Calving percent, weaned[4]	37	50	25	44	40	46
Av. weaning age, days	198	179	160	192	174	186
Adj. ADG[5]	2.08	1.94	1.86	1.71	1.86	1.94
Av. type score[6]	12.4	11.4	10.4	9.1	11.7	12.1
Av. condition score	9.8	9.2	9.2	8.4	9.8	9.8

1 - Purebreds, grade, line, backcross, 3-breed cross, treatment, etc.
2 - Total number put in breeding herd.
3 - Total number born, dead + alive.
4 - Number weaned divided by number of cows exposed.
5 - Indicate adjustments:
6 - 15, 16, and 17 = Fancy
12, 13, and 14 = Choice
9, 10, and 11 = Good
6, 7, and 8 = Medium

Age of dam:
Age of calf:
Sex of calf:
Other:

Va., F.R. (7)

FORM I
1961

COW-PRODUCTION CALF CROP

Front Royal, Virginia State

Location						
Breed of sire	Shorthorn	Shorthorn	Shorthorn	Shorthorn	Shorthorn	Shorthorn
Breed of dam	Shorthorn	Shorthorn	Shorthorn	Shorthorn	Shorthorn	Shorthorn
Line or group[1]	885-S1	1392-S2	B287-S4	114-S5	8852-S7	9807-S7
No. cows exposed[2]	21	18	13	16	15	14
No. calves born[3]	8	4	2	9	9	4
Calving percent, born	38	22	15	56	60	29
Av. birth date	2/27/61	3/14/61	1/20/61	3/9/61	1/27/61	3/10/61
Av. birth weight	74	78	69	74	70	72
Number calves weaned	4	3	2	6	7	3
Calving percent, weaned[4]	19	17	15	38	47	21
Av. weaning age, days	200	189	234	176	226	181
Adj. ADG[5]	1.58	1.62	1.84	1.56	1.62	1.70
Av. type score[6]	10.6	11.5	12.5	11.8	11.4	11.4
Av. condition score	8.0	8.7	9.8	8.8	9.1	8.8

1 - Purebreds, grade, line, backcross, 3-breed cross, treatment, etc.
2 - Total number put in breeding herd.
3 - Total number born, dead + alive.
4 - Number weaned divided by number of cows exposed.
5 - Indicate adjustments:
6 - 15, 16, and 17 = Fancy
12, 13, and 14 = Choice
9, 10, and 11 = Good
6, 7, and 8 = Medium

Age of dam:
Age of calf:
Sex of calf:
Other:

FORM I.

Va., F. R. (8) COW-PRODUCTION 1961 CALF CROP

Front Royal, Virginia State

Location						
Breed of sire	Shorthorn	Shorthorn	Various			
Breed of dam	Shorthorn	Shorthorn	Various			
Line or group[1]	8158-S8	9805-S8	Crossbred			
No. cows exposed[2]	23	17	26			
No. calves born[3]	15	7	16			
Calving percent, born	65	41	62			
Av. birth date	1/28/61	2/28/61	3/13/61			
Av. birth weight	73	71	73			
Number calves weaned	12	6	11			
Calving percent, weaned[4]	52	35	42			
Av. weaning age, days	222	186	181			
Adj. ADG[5]	1.58	1.58	2.06			
Av. type score[6]	10.4	11.5	11.8			
Av. condition score	8.8	8.6	10.0			

1 - Purebreds, grade, line, backcross, 3-breed cross, treatment, etc.
2 - Total number put in breeding herd.
3 - Total number born, dead + alive.
4 - Number weaned divided by number of cows exposed.
5 - Indicate adjustments:
6 - 15, 16, and 17 = Fancy
12, 13, and 14 = Choice
9, 10, and 11 = Good
6, 7, and 8 = Medium

Age of dam:
Age of calf:
Sex of calf:
Other:

FORM II

FOOT WEANING PERFORMANCE OF CALVES FED IN 1961

Front Royal, Virginia State

	Location	F. R.	F. R.	F. R.	F. R.	F. R.	F. R.
	Breed of sire	Angus	Angus	Angus	Angus	Angus	Angus
	Breed of dam	Angus	Angus	Angus	Angus	Angus	Angus
	Line or group *	1166-A1	057-A2	420-A3	890-A4	1349-A7	8184-A7
Bulls	No. in group	3	2		2	1	1
	Feed regime **						
	Av. init. age.	181	198		160	200	182
	Av. init. wt.	408	517		388	466	406
	Av.no.da.fed	168	168		168	168	168
	Av. final wt.	806	885		816	904	774
	ADG on test	2.37	2.19		2.55	2.61	2.19
	Av. type sc.	10.2	11.6		12.1	12.1	12.7
	Av. cond. sc.						
	Av. inbreeding	14	25		25	0	1
Heifers	No. in group	10	4	1	1	5	4
	Feed regime **						
	Av. init. age	257	245	196	259	228	211
	Av. init. wt.	513	440	411	273	468	446
	Av. no. da. fed	140	140	140	140	140	140
	Av. final wt.	686	602	606	449	637	627
	ADG on test	1.24	1.16	1.39	1.26	1.95	1.30
	Av. type sc.	10.9	12.7	10.6	8.1	11.6	11.3
	Av. cond. sc.						
	Av. inbreeding	25	28	25	25	3	
Steers	No. in group	3	3			2	
	Feed regime **						
	Av. init. age	255	235			200	
	Av. init. wt.	513	507			438	
	Av. no. da. fed	196	196			196	
	Av. final wt.	917	880			837	
	ADG on test	2.06	1.90			2.04	
	Av. type sc.	10.7	11.1			10.9	
	Av. cond. sc.						
	Av. inbreeding	23	29			5	

* Show whether station-owned or cooperator-owned, in addition to other group designation.

	Bulls	Steers	Heifers
How fed - full, limited, etc.	Full-fed	Full-fed	Limited
Pounds/day over feeding period			
Ration:	Steers and bulls fed same ration: Molasses 150 lbs. Corn and cob meal 1050 lbs. Linseed oil meal 150 lbs. Cottonseed oil meal 150 lbs. Alfalfa hay 250 lbs. Orchard grass hay 250 lbs. 2000 lbs. Access to 4 lbs. of loose hay per head per day.		Heifers fed 6 lbs./head per day of ration for bulls and steers + all the corn silage they would clean up + access to a maximum of 4 lbs. of loose hay/head/day.

Va., F. R. (10) FORM II

REGISTERING PERFORMANCE OF CALVES FED IN 56

Front Royal, Virginia State

	Location	F.R.	F.R.	F.R.	F.R.	F.R.	F.R.
	Breed of sire	Angus	Angus	Hereford	Hereford	Hereford	Hereford
	Breed of dam	Angus	Angus	Hereford	Hereford	Hereford	Hereford
	Line or group *	8044-A8	Purchased	322-H2	373-H3	8801-H4	Purchased
Bulls	No. in group	3	4	3	5	3	2
	Feed regime **						
	Av. init. age.	181	245	181	223	180	207
	Av. init. wt.	492	535	414	508	410	445
	Av.no.da.fed	168	168	168	168	168	168
	Av. final wt.	951	938	808	1023	855	892
	ADG on test	2.73	2.40	2.35	3.06	2.65	2.66
	Av. type sc.	11.3	13.3	10.8	11.6	12.1	13.0
	Av. cond. sc.						
	Av. inbreeding	3	0	0	0	0	0
Heifers	No. in group	7		8	14	9	
	Feed regime **						
	Av. init. age	231		220	217	237	
	Av. init. wt.	496		398	430	459	
	Av. no. da. fed	140		140	140	140	
	Av. final wt.	688		531	604	604	
	ADG on test	1.37		.95	1.24	1.03	
	Av. type sc.	12.3		10.6	10.5	11.6	
	Av. cond. sc.						
	Av. inbreeding	2		0	0	0	
Steers	No. in group	6		3	3	3	
	Feed regime **						
	Av. init. age	234		201	206	241	
	Av. init. wt.	502		392	451	466	
	Av. no. da. fed	196		196	196	196	
	Av. final wt.	913		781	888	885	
	ADG on test	2.10		1.99	2.23	2.14	
	Av. type sc.	12.3		10.5	10.3	11.7	
	Av. cond. sc.						
	Av. inbreeding	2	0	0	0	0	

* Show whether station-owned or cooperator-owned, in addition to other group designation.

	Bulls	Steers	Heifers
How fed - full, limited, etc.	Full-fed	Full-fed	Limited
Pounds/day over feeding period			
Ration:	Bulls and steers fed same ration:		Heifers fed 6 lbs./head per day of ration for bulls and steers + all the corn silage they would clean up + access to a maximum of 4 lbs. of loose hay per head per day.
	Molasses	150 lbs.	
	Corn and cob meal	1050 lbs.	
	Linseed oil meal	150 lbs.	
	Cottonseed oil meal	150 lbs.	
	Alfalfa hay	250 lbs.	
	Orchard-grass hay	250 lbs.	
		2000 lbs.	
	Access to 4 lbs. of loose hay per head per day.		

FORM II 1961

POSTWEANING PERFORMANCE OF CALVES FED IN

Front Royal, Virginia State

	Location	F. R.	F. R.	F. R.	F. R.	F. R.	F. R.
	Breed of sire	Shorthorn	Shorthorn	Shorthorn	Shorthorn	Shorthorn	Shorthorn
	Breed of dam	Shorthorn	Shorthorn	Shorthorn	Shorthorn	Shorthorn	Shorthorn
	Line or group *	885-S1	1392-S2	114-S5	1443-S7	8848-S7	1463-S8
Bulls	No. in group	2	1	3	2	1	
	Feed regime **						
	Av. init. age.	156	187	228	165	168	
	Av. init. wt.	398	461	471	357	400	
	Av.no.da.fed	168	168	168	168	168	
	Av. final wt.	851	802	910	780	920	
	ADG on test	2.70	2.03	2.61	2.52	3.09	
	Av. type sc.	9.6	13.1	11.9	12.9	13.0	
	Av. cond. sc.						
	Av. inbreeding	40	30	17	3	0	
Heifers	No. in group	1	5	2	1		1
	Feed regime **						
	Av. init. age	221	236	245	205		289
	Av. init. wt.	396	475	438	444		510
	Av. no. da. fed	140	140	140	140		140
	Av. final wt.	627	666	608	647		754
	ADG on test	1.65	1.36	1.22	1.45		1.74
	Av. type sc.	10.4	12.3	12.0	11.6		11.9
	Av. cond. sc.						
	Av. inbreeding	45	32	25	7		4
Steers	No. in group	3	3	2			1
	Feed regime **						
	Av. init. age	181	191	231			289
	Av. init. wt.	378	399	393			529
	Av. no. da. fed	196	196	196			196
	Av. final wt.	774	828	818			1008
	ADG on test	2.03	2.19	2.17			2.44
	Av. type sc.	9.8	11.2	10.3			12.0
	Av. cond. sc.						
	Av. inbreeding	35	33	25			4

* Show whether station-owned or cooperator-owned, in addition to other group designation.

	Bulls	Steers	Heifers
How fed - full, limited, etc.	Full-fed	Full-fed	Limited
Pounds/day over feeding period			
Ration:	Bulls and steers fed same ration:		Heifers fed 6 lbs. per head per day of ration for bulls and steers + all the corn silage they would clean up + access to a maximum of 4 lbs. of loose hay per head per day.
	Molasses	150 lbs.	
	Corn and cob meal	1050 lbs.	
	Linseed oil meal	150 lbs.	
	Cottonseed oil meal	150 lbs.	
	Alfalfa hay	250 lbs.	
	Orchard-grass hay	250 lbs.	
		2000 lbs.	
	Access to 4 lbs. of loose hay per head per day.		

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Va., F. R. (12)

FORM II

POST-WEANING PERFORMANCE OF CALVES FED IN 1961

Front Royal, Virginia State

	Location	F.R.	F.R.				
	Breed of sire	Shorthorn	Shorthorn				
	Breed of dam	Shorthorn	Shorthorn				
	Line or group *	8158-S8	Purchased				
Bulls	No. in group	2	2				
	Feed regime **						
	Av. init. age.	187	258				
	Av. init. wt.	450	519				
	Av.no.da.fed	168	168				
	Av. final wt.	974	958				
	ADG on test	3.12	2.61				
	Av. type sc.	11.4	11.2				
	Av. cond. sc.						
	Av. inbreeding	10	0				
Heifers	No. in group	3					
	Feed regime **						
	Av. init. age	197					
	Av. init. wt.	418					
	Av. no. da. fed	140					
	Av. final wt.	622					
	ADG on test	1.46					
	Av. type sc.	11.3					
	Av. cond. sc.						
	Av. inbreeding	4					
Steers	No. in group	1					
	Feed regime **						
	Av. init. age	213					
	Av. init. wt.	408					
	Av. no. da. fed	196					
	Av. final wt.	873					
	ADG on test	2.37					
	Av. type sc.	12.2					
	Av. cond. sc.						
	Av. inbreeding	4					

* Show whether station-owned or cooperator-owned, in addition to other group designation.

	Bulls	Steers	Heifers
How fed - full, limited, etc.	Full-fed	Full-fed	Limited
Pounds/day over feeding period			
Ration:	Bulls and steers fed same ration: Molasses [illegible] lbs. Corn and cob meal 1050 lbs. Linseed oil meal 150 lbs. Cottonseed oil meal 150 lbs. Alfalfa hay 250 lbs. Orchard-grass hay 250 lbs. 2000 lbs. Access to 4 lbs. of loose hay per head per day.		Heifers fed [illegible] head per day of [illegible] for bulls and [illegible] all the corn silage they would clean up [illegible] to a maximum of [illegible] of loose hay per head per day.

FORM III

SLAUGHTER DATA, 1961

Front Royal, Virginia State

Location	F. R.	F. R.	F. R.	F. R.	F. R.	F. R.
Breed of sire	Angus	Angus	Angus	Angus	Hereford	Hereford
Breed of dam	Angus	Angus	Angus	Angus	Hereford	Hereford
Line or group	1166-A1	057-A2	1349-A7	8044-A8	322-H2	373-H3
Sex	Steer	Steer	Steer	Steer	Steer	Steer
Age at slaughter	461	473	436	437	415	412
No. slaughtered	3	3	2	6	3	3
Days in feedlot	196	196	196	196	196	196
Final feedlot wt.	917	880	837	913	781	888
Slaughter wt., live	873	851	816	871	776	853
Carcass wt., cold	518	505	493	524	466	520
Dressing percent, cold	59	59	60	60	60	61
Carcass grade, quality	11	11.3	11	11.7	11	11.5
Carcass grade, cutability						
Estimated percent, kidney fat						
Ribeye area/100 lbs. carcass	1.80	2.11	1.96	2.13	2.43	2.13
Marbling score ***	15.3	14.0	15.0	15.3	14.7	16.0
Fat thickness over ribeye*	16.8	15.0	17.8	17.1	12.9	14.3
W-B shear force, pounds**	14.73	21.44	14.28	14.21	14.50	15.17

* Use one measure - if not, indicate method.

** Indicate size of core used and how meat was cooked.
Nine one-inch cores per animal; baked.

*** 8-12 = abundant
14-18 = moderately abundant
20-24 = slightly deficient

FORM III

SLAUGHTER DATA, 1961

Front Royal, Virginia State

Location	F. R.	F. R.	F. R.	F. R.	F. R.	F. R.
Breed of sire	Hereford	Shorthorn	Shorthorn	Shorthorn	Shorthorn	Shorthorn
Breed of dam	Hereford	Shorthorn	Shorthorn	Shorthorn	Shorthorn	Shorthorn
Line or group	8801-H4	855-S1	1392-S2	114-S5	1463-S8	8158-S8
Sex	Steer	Steer	Steer	Steer	Steer	Steer
Age at slaughter	447	396	402	440	491	414
No. slaughtered	3	3	3	2	1	1
Days in feedlot	196	196	196	196	196	196
Final feedlot wt.	885	774	828	818	1008	873
Slaughter wt.,live	855	750	810	792	944	834
Carcass wt., cold	508	470	485	470	562	512
Dressing percent, cold	59	63	60	59	60	61
Carcass grade, quality	12.0	11.3	11.3	10.5	11	11
Carcass grade, cutability						
Estimated percent, kidney fat						
Ribeye area/100 lbs. carcass	2.31	3.40	2.05	2.16	1.77	1.97
Marbling score	15.3	14.0	16.0	15.0	12.0	16.0
Fat thickness over ribeye*	17.0	12.2	17.2	11.4	17.3	11.3
W-B shear force, pounds**	15.18	14.67	21.28	12.87	15.38	17.99

* Use one measure - if not, indicate method

** Indicate size of core used and how meat was cooked.
Nine one-inch cores per animal; baked.

*** 8-12 = abundant
14-18 = moderately abundant
20-24 = slightly deficient

West Virginia University
Agricultural Experiment Station

I. PROJECT: Hatch 90 (S-10)

Reproductive Efficiency of Beef Cattle

II. OBJECTIVES:

To determine the practicability and effects of breeding beef cows at first heat following parturition.

To determine the incidence of ovulatory anomolies in beef cattle and their effects on reproductive performance.

To compare the reproductive efficiency of two breeds of beef cattle when managed under like conditions.

III. PERSONNEL:

H. E. Kidder and G. C. Anderson

IV. ACCOMPLISHMENTS DURING THE YEAR:

Comparisons of the conception rate of cows first bred within similar postpartum intervals has revealed no statistical differences between groups having involuted or non-involuted uteri; however, cows bred after seventy-nine days postpartum had a significantly higher ($P < .05$) conception rate at first service than cows bred previous to seventy-nine days postpartum. Thus, it would appear that the length of the postpartum interval previous to first breeding may be of greater importance in achieving satisfactory conception than is the involutionary state of the uterus as judged by manual palpation.

V. FUTURE PLANS:

This project has been concluded from the standpoint of data collection. Final analysis of the data and the preparation of an additional manuscript is underway.

VI. PUBLICATIONS DURING THE YEAR:

None

VII. PUBLICATIONS PLANNED:

"The Relation of Uterine Involution and Postpartum Interval to Reproduction Efficiency in [illegible] Herds of Beef Cattle" has been submitted to the Journal of Animal Science.

Submitted by: H. E. Kidder

23?
W. Va. (2)

COW-PRODUCTION 1961 CALF CROP

West Virginia State

Location	Wardensville					
Breed of sire	Hereford					
Breed of dam	Hereford					
Line or group[1]						
No. cows exposed[2]	108					
No. calves born[3]	105					
Calving percent, born	97					
Av. birth date	3/2/61					
Av. birth weight	66					
Number calves weaned	93					
Calving percent, weaned[4]	86					
Av. weaning age, days	160					
Adj. ADG[5]	1.51					
Av. type score[6]	11					
Av. condition score	-					

1 - Purebreds, grade, line, backcross, 3-breed cross, treatment, etc.
2 - Total number put in breeding herd.
3 - Total number born, dead + alive.
4 - Number weaned divided by number of cows exposed.
5 - Indicate adjustments:
6 - 15, 16, and 17 = Fancy
12, 13, and 14 = Choice
9, 10, and 11 = Good
6, 7, and 8 = Medium

Sex of calf

APPENDIX

APPENDIX TABLE 1. How the Contributing Projects' Objectives Fit Into The Objectives of the S-10 Project

State and Title of Contributing Project	Objective 1 - To develop methods, selection criteria and procedures which will result in beef cattle capable of higher productive efficiency and superior market qualities of product.	Objective 2 - To develop beef cattle with higher reproductive efficiency, greater longevity, and other aspects of lifetime productive efficiency.	Objective 3 - To develop beef cattle especially adapted to conditions in various environments of the Region	Objective 4 - To explore usefulness of systems of inbreeding, crossbreeding, outbreeding and combinations of these to accomplish 1, 2 and 3.	Objective 5 - To study productiveness of existing or introduced stocks.
ALABAMA: Hatch 525 Improvement of Beef Cattle in Alabama Through Breeding. 1950; revised 1958. Auburn and Blackbelt	Obj. 1: To determine the effectiveness of selection for total performance in beef cattle. Obj. 2: To develop criteria for evaluating and selecting breeding animals			Obj. 3: To determine the influence of heterosis on rate of gain, carcass quality and cow performance.	Obj. 1: Performance and maternal abilities.
FUTURE WORK:	Additional live animal carcass studies. Additional maternal ability work.				
ARKANSAS: Hatch 170 Evaluation of Performance Records of Beef Cattle 1957. Fayetteville and Batesville	Obj. 1: To continue to develop practical but adequate methods for identifying, evaluating and propogating the genetic potential				Obj. 1: Performance and maternal abilities.

State and Title	Objective 1	Objective 2	Objective 3	Objective 4	Objective 5
ARKANSAS: Hatch 170 (continued)	for the production of beef. This would involve the determination of the kind and number of performance records necessary to prove beef sires and dams as well as proper use of the records in planned matings				
FUTURE WORK:	Early and more accurate indication of efficient production and carcass merit.		Study the relative importance of various records of performance under different systems of production		
FLORIDA: State 390 Breeding Beef Cattle for Adaptation to Florida. 1949. Gainesville			Obj. 1: To determine the desirability of certain crosses as foundation animals for beef herds and the value of such crosses for commercial beef production.	Obj. 1: Usefulness of crossbreeding	Obj. 1: Evaluate certain crosses as foundation stock.
FUTURE WORK:	- - - - - - - - - - Two more calf crops on breed-pasture study; project to close out - - -				

State and Title	Objective 1	Objective 2	Objective 3	Objective 4	Objective 5
FLORIDA: State 629 Selection of Cattle for Beef Production in the Southeastern United States 1952; revised 1959. Brooksville - Coop. Fla. and USDA.	Obj. 1: To improve the reproductive efficiency and meat producing qualities of different strains of cattle under Florida conditions, to test various breeding systems with these cattle and to determine if combining ability can be increased by cross-progeny testing.	Obj. 1: To improve reproductive efficiency.	Obj. 1: To improve different strains of beef cattle under Florida conditions.	Obj. 1: To test various breeding systems with different strains of cattle and to determine if combining ability can be increased by cross-progeny testing.	Obj. 1: To study existing strains and ways to improve them.
FUTURE WORK:			Plans are under way for genetic-environmental interaction study, exchange cattle between Florida and Montana.	Work on specific combining ability will be in progress next year.	
FLORIDA: Hatch 752 Genetics of Dwarfism in Beef Cattle. 1955; revised 1960. Gainesville	Obj. 1: To describe and characterize the various types of dwarfism manifested in beef cattle of various breeds in Florida. Obj. 2: To investigate the genetic relationship between the more prevalent types of dwarfism. Obj. 3: To determine the influence of genetic environment on expression of the snorter dwarfism gene.				Obj. 1: To study dwarfism in various breeds of cattle.
FUTURE WORK:	A grant is being sought to complete the work on excretion of acid mucopolysaccharides by dwarf carriers and to expand investigations to other biochemical attributes of dwarfs, carriers, and non-carriers.				

State and Title	Objective 1	Objective 2	Objective 3	Objective 4	Objective 5
GEORGIA: Hatch 209 A Study of Breeding, Crisscrossing and Rotational Crossing as Breeding Systems for Commercial Beef Production. 1956. Reidsville				Obj. 1: To study the relative value of grading, crisscrossing and rotational crossing as systems of breeding for commercial beef production. Obj. 2: To study heterotic effects in crosses between Angus and Polled Hereford breeds as compared to heterosis in crosses between these breeds and Santa Gertrudis, a breed partially on a Brahman foundation.	Obj. 3: to study the comparative value of the Santa Gertrudis breed with the Angus and Polled Hereford breeds.
FUTURE WORK:				Continue as outlined. Data to be analyzed by generations; after an analysis of the 1st generation data has been completed, the project may be revised.	
GEORGIA: Hatch 224 Improvement of Performance and Carcass Quality in Beef Cattle through Selection. 1951; revised 1961. Tifton	Obj. 1: To study and evaluate methods of developing breeds of Polled Hereford and Angus cattle with superior performance. Obj. 2: To progeny-test Polled Hereford and Angus sires with selection criteria based primarily on pre- and post-				

State and Title	Objective 1	Objective 2	Objective 3	Objective 4	Objective 5
GEORGIA: Hatch 209 (continued)	weaning growth rate, and tenderness	carcass meatiness			
FUTURE WORK:	- - - - - -		Continue as outlined; more emphasis on carcass desirability - - -		
GEORGIA: State 2-99 Selection of Beef Cattle for Single Items of Importance in Profitable Beef Production. 1961. Reidsville.	Obj. 1: To obtain information on the relative effectiveness of selecting for a single character. Obj. 2: To observe trends in characters for which no selection is made when selection is for a single character.				
FUTURE WORK:	- - - - - - - -		As outlined - - -	- - - - - - -	
KENTUCKY: Hatch 260 Measurement and Selection of Economically Important Traits in Beef Cattle. 1961. Mercer County, Shale Ridge and Princeton.	Obj. 1: To use rate of gain, efficiency of gain, conformation and carcass characteristics in an overall selection experiment. Obj. 2: To develop a method of estimating a bull's transmitting ability for carcass characters as well as rate of gain and conformation.				
FUTURE WORK:	- - - - - - - -		As outlined - - -	- - - - - - -	

State and Title	Objective 1	Objective 2	Objective 3	Objective 4	Objective 5
LOUISIANA: Hatch 605 Comparison of Various Crossbred and High Grade Cattle under Gulf Coast Conditions with Respect to Rate of Growth on Pasture, Fattening Ability and Meat Quality of Steers. 1953; Revised 1960. Baton Rouge.	Obj. 4: To study the productive ability of dams of various breeds and crosses. Obj. 5: To study and estimate genetic parameters.	Obj. 4: To study the productive ability of dams of various breeds and crosses.	Obj. 1: To study types and breeds of beef cattle to determine which are best suited to conditions along the Gulf Coast with respect to rate of growth, fattening ability and meat quality. Obj. 6: To study practical problems of management and marketing of cross-bred cattle in the Gulf Coast area.	Obj. 2: To study various crossbreeding programs as to practicality, production and usefulness. Obj. 3: To study amount of hybrid vigor obtained through crossing beef breeds and to ascertain how much of this hybrid vigor is maintained through subsequent backcrossing, multiple breeding and rotational crossing.	Obj. 1: To study types and breeds of beef cattle to determine which are best suited to the Gulf Coast.
FUTURE WORK:	Additional emphasis on cow production and reproduction				
MISSISSIPPI: Hatch 642 Lowered Fertility in the Bovine. 1957. State College		Obj. 1: To make a survey of the reproductive performance of cattle in the Miss. Exp. Station system: (a) to determine the reproductive efficiency for each herd of the system, and (b) to determine what factors may be contributing to reproductive inefficiency.			

State and Title	Objective 1	Objective 2	Objective 3	Objective 4	Objective 5
ISSISSIPPI: Hatch 642 (continued)		Obj. 2: To determine the nature of sterility in cows leaving the herd because of low reproductive performance. Obj. 3: Propose and test possible treatments which may increase reproductive efficiency.			
FUTURE WORK:		Study nature of low fertility and test hormones which may effectively increase the low fertility level.			
ISSISSIPPI: Hatch 666 Study to Determine the reeding Worth of Inbred nd Outbred Bulls from arious Sources. 1954; evised 1960. Prairie	Obj. 1: To compare the growth rates, carcass qualities and maternal abilities of the progenies of bulls selected from various sources as being potentially superior sires. Obj. 2: To develop a high producing herd of cows by using the progeny of good producing bulls and replacement heifers. Obj. 3: To determine the effectiveness of a selection index when used on heifers at weaning.				

State and Title	Objective 1	Objective 2	Objective 3	Objective 4	Objective 5
MISSISSIPPI: Hatch 666 (continued)					
FUTURE WORK:	Study relationships of carcass traits to live measures such as birth weight, weaning weight and grade, and post-weaning weights and grades. Study methods of measuring carcass quality in live animals. Study methods of incorporating a desirable trait into a herd and how to maintain it. Study whether the importance of a trait remains constant.				
NORTH CAROLINA: Hatch 198 Genetic and Environmental Interactions for Performance and Carcass Traits in Beef Cattle. 1955; revised 1960. Laurel Springs, Raleigh, Fry Pan and Plymouth.	Obj. 1: To evaluate the importance of sire X location interactions for performance traits. Obj. 3: To develop and evaluate selection criteria for the improvement of production efficiency and market quality.		Obj. 1: Study the importance of sire X location interaction for performance traits. Obj. 2: To evaluate sire X location and ration interaction for gain and carcass characteristics of steer progeny.		
FUTURE WORK:	- - - -	- - - -	Continue as outlined	- - - -	
SOUTH CAROLINA: Hatch 479 The Response of Sire Progenies to Management and Feeding Procedures. 1959. Clemson, Edisto, Summerville	Obj. 2: To evaluate the magnitude and importance of the average genotype with certain environmental influences. Obj. 3: To develop through selection herds of beef cattle	Obj. 3: To develop through selection breeds of beef cattle with superior performance.	Obj. 1: To investigate the response of sire progenies as measured by live animal and carcass traits to methods of producing slaughter cattle.		

State and Title	Objective 1	Objective 2	Objective 3	Objective 4	Objective 5
SOUTH CAROLINA: Hatch 479 (continued)	with superior performance.				
FUTURE WORK:	Study what traits to be included in selection index. Study how carcass information should be included in selection program. Study what live animal traits can be used to indicate carcass desirability.				
TENNESSEE: Hatch 61 The Improvement of the Producing Ability of Beef Cattle. 1948; Revised 1956. Alcoa, Oak Ridge, Ames, Crossville, Greeneville	Obj. 2: To develop effective breeding techniques for improving the productivity of existing lines of beef cattle.	Obj. 3: To develop lines or line crosses of beef cattle that will make the most efficient use of Tennessee pastures and forages and that will result in an improvement of such characters as rate of gain, efficiency of gain, carcass quality, longevity and fertility. Obj. 4: To investigate the effect of different levels of nutrition and management regimes on growth and the development of type and conformation, efficiency of gain, fertility and longevity.			Obj. 1: To investigate the productiveness of existing lines of beef cattle.
FUTURE WORK:	Compare selection of bulls from within a herd to selection of bulls from outside as to progress in growth rate and type. These two selection methods will be compared				

State and Title	Objective 1	Objective 2	Objective 3	Objective 4	Objective 5
TENNESSEE: Hatch 61 (continued)	to an average control. Study carcass evaluation in live animals and ways to determine carcass merit.				
TENNESSEE: Hatch 65 The Detection of Animals Heterozygous for Recessive Bovine Dwarfism. 1955. Knoxville.	Obj. 1: To investigate methods of identifying at young ages animals heterozygous for recessive bovine dwarfism.				
FUTURE WORK.	- - - - - Continue as outlined		- - - - - -		
TEXAS: Hatch 650 The Improvement of Production and Desirability of Beef Through Breeding Methods. 1950; revised 1960. McGregor, College Station	Obj. 1: To estimate and further test by selection and breeding genetic parameters including heritability, heterotic effect and genetic correlation for weaning weight, post-weaning feedlot and pasture gains, gain during summer months, beef value of the carcass, eating desirability, and so forth. Obj. 3: To develop procedures and techniques adequate for practical application in record-keeping,				Obj. 2: To test breeds and strains of unknown or unrecorded productivity.

State and Title	Objective 1	Objective 2	Objective 3	Objective 4	Objective 5
TEXAS: Hatch 650 (continued)	artificial insemination and other areas involved in management that present an obvious need in a breeding program.				
FUTURE WORK:	- -	- - -	Continue as revised -	- - - - -	- -
TEXAS. Hatch 714 Biochemical and Fundamental Physiological Changes Occurring with Genetically Variable Growth of Animals. 1954; revised 1961. College Station	Obj. 1: To delinate by quantative and mathematical descriptions certain basic biochemical and physiological changes as they occur with growth of animals. Obj. 2: To evaluate the phenotypic and genetic correlations of certain variations in biochemical and physiological change to modifications in patterns of postnatal growth. Obj. 3: To develop methods of biochemical or physiological nature which will measure the potential rate of gain and efficiency of feed				

State and Title	Objective 1	Objective 2	Objective 3	Objective 4	Objective 5
TEXAS: Hatch 714 (continued)	utilization in young beef animals				
FUTURE PLANS:	Study pattern of growth of animals and development of the rumen				
TEXAS: Hatch 959 Biochemical and Physiological Anomalies of Bovine Dwarfism and their Use in Detection of Heterozygotes. 1955. College Station.	Obj. 1: The detection of biochemical and phsyiological anomalies which may be associated with bovine dwarfism of various types, with an attempt to identify the metabolic defect(s) which cause the dwarfism. Obj. 2: The determination of the extent to which the biochemical and physiological factors which are anomalous in dwarfs vary in normal animals. Obj. 3: The determination of the usefulness of the variation of these factors in distinguishing between the normal carriers and non-carriers of the genes conditioning the dwarfism. Obj. 4: The use of these factors in studying further the mode of inheritance.				
FUTURE WORK:	- - - - - - -	Continue as outlined	- - -	- - - - - - -	-
VIRGINIA: Hatch 93901 Heterosis from Crosses Among British Breeds of Beef Cattle. 1955. Steeles Tavern				Obj. 1: To measure heterosis obtained from crosses among Angus, Hereford and Shorthorn beef	

State and Title	Objective 1	Objective 2	Objective 3	Objective 4	Objective 5
VIRGINIA: Hatch 93401 (continued)				cattle as shown by growth rate, fattening ability and carcass quality up to approximately 20 months of age and productive ability of dams.	
FUTURE WORK:	- - - - - - - - Continue as outlined - - - -			- - - - - - - - - - - -	
VIRGINIA: State S-0131-S The Improvement of Beef Cattle for Virginia through Breeding Methods. 1948; revised 1959. Front Royal	Obj. 1: To estimate the progress to be expected from mass selection as compared with family selection in the improvement of beef cattle. Obj. 2: To evaluate selection criteria and procedures, and develop more precise and effective measures of quality and performance in beef cattle. Obj. 3: To simplify methods of progeny or sib testing whereby breeding cattle can be evaluated at comparatively young ages.				
FUTURE WORK:	Combination of various traits into indexes, work on emphasis of traits in index as to heritability and economic value, work on effects of environmental factors on performance test results, use of artificial insemination in beef herds, work on carcass quality and its importance, work on importance of genotype-environment interactions.				
WEST VIRGINIA: Hatch 90 Reproductive Efficiency of Beef Cattle. 1955; revised 1958. Morgantown.		Obj. 1: To determine the practicability and effects of breeding beef cows at			

State and Title	Objective 1	Objective 2	Objective 3	Objective 4	Objective 5
WEST VIRGINIA: Hatch 90 (continued)		first heat following parturition. Obj. 2: To determine the incidence of ovulatory anomalies in beef cattle and their effects on reproductive performance. Obj. 3: To compare the reproductive efficiency of two breeds of beef cattle when managed under like conditions.			
FUTURE WORK:	- - - - - - -	- - - Continue as outlined - - -		- - - - - - - -	
LOUISIANA: Iberia Livestock Exp. Station., AHRD L. P. d1-6(R). Development of Pure and Crossbred Types of Cattle for Southeastern United States and the Gulf Coast Region. 1953; revised. Jeanerette.		Obj. 6: To study fertility among the several breeding groups under normal management procedures on the Station.		Obj. 2: To assess the progress made with crossbred lines of Brangus by comparing them to first crosses of the two parent breeds. Obj. 4: To study and evaluate carcass merit and quality of the steers and heifers from the various crossbred lines, purebreds and other crosses. Obj. 5: To evaluate the combining ability	Obj. 1: To evaluate the performance of strains of Brangus and Africander-Angus with Angus and Brahman. Obj. 3: To explore the use and value of Sindhi cattle by crossing the cows with Angus and Brahman bulls and by mating Sindhi bulls to random samples of Brangus and Africander-Angus cows.

State and Title	Objective 1	Objective 2	Objective 3	Objective 4	Objective 5
LOUISIANA (Jeanerette): ARD L. P. dl-6 (R) (continued)				of Angus, Brahman and Sindhi bulls when bred to random samples of Brangus and Africander-Angus cows by studying the growth and carcass merit of the progeny.	
FUTURE WORK:	Study the genetic, physiological, nutritional and environmental factors effecting reproduction, growth rate, feed efficiency and carcass characteristics of cattle of different breeding in the Gulf Coast area.				

APPENDIX TABLE 2. Summary of how the Present Objectives of the Contributing Projects Fit into the Objectives of the S-10 Project

Objective 1 - To develop methods, selection criteria and procedures which will result in beef cattle capable of higher productive efficiency and superior market qualities of product.	Objective 2 - To develop beef cattle with higher reproductive efficiency, greater longevity, and other aspects of lifetime producing efficiency.	Objective 3 - To develop beef cattle especially adapted to conditions in various environments of the Region.	Objective 4 - To explore usefulness of systems of inbreeding, crossbreeding, outbreeding and combinations of these to accomplish objectives 1, 2 and 3.	Objective 5 - To study productiveness of existing or introduced stocks.
Ala. H525, Obj. 1	Fla. S629, Obj. 1	Fla. S390, Obj. 1	Ala. H525, Obj. 3	Ala. H525, Obj. 1
Ala. H525, Obj. 2	Fla. H752, Obj. 1	Fla. S629, Obj. 1	Fla. S390, Obj. 1	Ark. H170, Obj. 1
Ark. H170, Obj. 1	Fla. H752, Obj. 2	La. H605, Obj. 1	Fla. S629, Obj. 1	Fla. S390, Obj. 1
Fla. S629, Obj. 1	Fla. H752, Obj. 3	La. H605, Obj. 6	Ga. H209, Obj. 1	Fla. S629, Obj. 1
Fla. H752, Obj. 1	Ga. H224, Obj. 1	N. C. H198, Obj. 1	Ga. H209, Obj. 2	Fla. H752, Obj. 2
Fla. H752, Obj. 2	Ga. H224, Obj. 2	N. C. H198, Obj. 2	La. H605, Obj. 2	Ga. H209, Obj. 3
Fla. H752, Obj. 3	La. H605, Obj. 4	S. C. H479, Obj. 1	La. H605, Obj. 3	La. H605, Obj. 1
Ga. H224, Obj. 1	Miss. H642, Obj. 1	Tenn. H61, Obj. 3	Va. H93901, Obj. 1	Tenn. H61, Obj. 1
Ga. H224, Obj. 2	Miss. H642, Obj. 2	Tenn. H61, Obj. 4	La.(J) AHRD dl-6,Obj.2	Texas H650, Obj. 2
Ga. S2-99, Obj. 1	Miss. H642, Obj. 3		La.(J) AHRD dl-6,Obj.4	La.(J) AHRD dl-6,Obj.1
Ga. S2-99, Obj. 2	Miss. H666, Obj. 2		La.(J) AHRD dl-6,Obj.5	La.(J) AHRD dl-6,Obj.3
Ky. H260, Obj. 1	S. C. H479, Obj. 3			
Ky. H260, Obj. 2	Tenn. H61, Obj. 3			
La. H605, Obj. 4	Tenn. H61, Obj. 4			
La. H605, Obj. 5	Texas H959, Obj. 2			
Miss. H666, Obj. 1	Texas H959, Obj. 3			
Miss. H666, Obj. 2	Texas H959, Obj. 4			
Miss. H666, Obj. 3	Va. S-0131-S, Obj. 1			
N. C. H198, Obj. 1	Va. S-0131-S, Obj. 2			
N. C. H198, Obj. 3	Va. S-0131-S, Obj. 3			
S. C. H479, Obj. 2	W.Va. H90, Obj. 1			
S. C. H479, Obj. 3	W.Va. H90, Obj. 2			
Tenn. H61, Obj. 2	W.Va. H90, Obj. 3			
Tenn. H65, Obj. 1	La.(AHRD dl-6, Obj.6			
Texas H650, Obj. 1				
Texas H650, Obj. 3				
Texas H714, Obj. 3				
Texas H714, Obj. 2				

State and Title	Objective 1	Objective 2	Objective 3	Objective 4	Objective 5
LOUISIANA (Jeanerette): AHRD L. P. d1-6 (R) (continued)				of Angus, Brahman and Sindhi bulls when bred to random samples of Brangus and Africander-Angus cows by studying the growth and carcass merit of the progeny.	
FUTURE WORK:	Study the genetic, physiological, nutritional and environmental factors effecting reproduction, growth rate, feed efficiency and carcass characteristics of cattle of different breeding in the Gulf Coast area.				

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Ala. H525, Obj. 1	Fla. S629, Obj. 1	Fla. S390, Obj. 1	Ala. H525, Obj. 3	Ala. H525, Obj. 1
Ala. H525, Obj. 2	Fla. H752, Obj. 1	Fla. S629, Obj. 1	Fla. S390, Obj. 1	Ark. H170, Obj. 1
Ark. H170, Obj. 1	Fla. H752, Obj. 2	La. H605, Obj. 1	Fla. S629, Obj. 1	Fla. S390, Obj. 1
Fla. S629, Obj. 1	Fla. H752, Obj. 3	La. H605, Obj. 6	Ga. H209, Obj. 1	Fla. S629, Obj. 1
Fla. H752, Obj. 1	Ga. H224, Obj. 1	N. C. H198, Obj. 1	Ga. H209, Obj. 2	Fla. H752, Obj. 2
Fla. H752, Obj. 2	Ga. H224, Obj. 2	N. C. H198, Obj. 2	La. H605, Obj. 2	Ga. H209, Obj. 3
Fla. H752, Obj. 3	La. H605, Obj. 4	S. C. H479, Obj. 1	La. H605, Obj. 3	La. H605, Obj. 1
Ga. H224, Obj. 1	Miss. H642, Obj. 1	Tenn. H61, Obj. 3	Va. H93901, Obj. 1	Tenn. H61, Obj. 1
Ga. H224, Obj. 2	Miss. H642, Obj. 2	Tenn. H61, Obj. 4	La.(J) AHRD d1-6,Obj.2	Texas H650, Obj. 1
Ga. S2-99, Obj. 1	Miss. H642, Obj. 3		La.(J) AHRD d1-6,Obj.4	La.(J) AHRD d1-6,Obj.1
Ga. S2-99, Obj. 2	Miss. H666, Obj. 2		La.(J) AHRD d1-6,Obj.5	La.(J) AHRD d1-6,Obj.3
Ky. H260, Obj. 1	S. C. H479, Obj. 3			
Ky. H260, Obj. 2	Tenn. H61, Obj. 3			
La. H605, Obj. 4	Tenn. H61, Obj. 4			
La. H605, Obj. 5	Texas H959, Obj. 2			
Miss. H666, Obj. 1	Texas H959, Obj. 3			
Miss. H666, Obj. 2	Texas H959, Obj. 4			
Miss. H666, Obj. 3	Va. S-0131-S, Obj. 1			
N. C. H198, Obj. 1	Va. S-0131-S, Obj. 2			
N. C. H198, Obj. 3	Va. S-0131-S, Obj. 3			
S. C. H479, Obj. 2	W.Va. H90, Obj. 1			
S. C. H479, Obj. 3	W.Va. H90, Obj. 2			
Tenn. H61, Obj. 2	W.Va. H90, Obj. 3			
Tenn. H65, Obj. 1	La.(J) AHRD d1-6, Obj.6			
Texas H650, Obj. 1				
Texas H650, Obj. 3				
Texas H714, Obj. 1				
Texas H714, Obj. 2				

APPENDIX
TABLE 2. (continued)

Objective 1	Objective 2	Objective 3	Objective 4	Objective 5
Texas	H714, Obj. 3			
Texas	H959, Obj. 1			
Texas	H959, Obj. 2			
Texas	H959, Obj. 3			
Texas	H959, Obj. 4			
Va.	S-0131-S, Obj. 1			
Va.	S-0131-S, Obj. 2			
Va.	S-0131-S, Obj. 3			

APPENDIX TABLE 3. Summary of How Present Projects and Future Plans of These Projects Fit Into Objectives of the S-10 Project

Objective 1 - To develop methods, selection criteria and procedures which will result in beef cattle capable of higher productive efficiency and superior market qualities of product.	Objective 2 - To develop beef cattle with higher reproductive efficiency, greater longevity, and other aspects of lifetime producing efficiency.	Objective 3 - To develop beef cattle especially adapted to conditions in various environments of the Region.	Objective 4 - To explore usefulness of systems of inbreeding, crossbreeding, outbreeding and combinations of these to accomplish objectives 1, 2 and 3.	Objective 5 - To study productiveness of existing or introduced stocks.
Ala. H525	Fla. H752*	Ark. H170*	Fla. H629*	Ga. H209
Ark. H170*	Ga. H224	Fla. H629*	Ga. H209*	La. H605
La. H752*	La. H605*	La. H605	La. H605	Tenn. H61
Ga. H224	Miss. H642*	N.C. H198	Va. H93901	Texas H650
Ga. S2-99	Miss. H666*	S.C. H479	La.(J) AHRD d1-6	La.(J) AHRD d1-6
Ky. H260	S.C. H479	Tenn. H61		
La. H605	Tenn. H61			
Miss. H666*	Texas H959			
N.C. H198	Va. S-0131-S*			
S.C. H479*	W. Va. H90			
Tenn. H61*	La.(J) AHRD d1-6*			
Tenn. H65				
Texas H650				
Texas H714				
Texas H959				
Va. S-0131-S*				
La.(J) AHRD d1-6*				

- Ideas for future work that are not necessarily covered in the present project objectives.

Florida Project S390 is closing out after one or two more calf crops.

APPENDIX TABLE 4. Summary of Contributions of State Projects to the S-10 Project

Objective 1 - To develop methods, selection criteria, and procedures which will result in beef cattle capable of higher productive efficiency and superior market qualities of product.	Objective 2 - To develop beef cattle with higher reproductive efficiency, greater longevity, and other aspects of lifetime producing efficiency	Objective 3 - To develop beef cattle especially adapted to conditions in various environments of the Region.	Objective 4 - To explore usefulness of systems of inbreeding, crossbreeding, outbreeding, and combinations of these to accomplish Objectives 1, 2, and 3.	Objective 5 - To study productiveness of existing or introduced stocks.
Ala. H525	Fla. S629	All projects	Ala. H525	All projects
Ark. H170	La. H605		Fla. S390	
Fla. S629	Miss. H642	Fla. S390	Fla. S629	
Fla. H752	W. Va. H90	Fla. S629	La. H605	
Ga. H209	La.(J.) AHRD d1-6	La. H605	Va. H93901	
La. H605	N. C. S74 (closed out, 1960)	Texas H650	La.(J.) AHRD d1-6	
Miss. H666	N. C. S46	Va. H93901		
S. C. H479		La.(J.)AHRD d1-6		
Tenn. H61		N. C. S46		
Texas H650				
Texas H714				
Texas H959				
Va. S-0131-S				

APPENDIX TABLE 5. Reproductive Performance of Cows in S-10 Project by Breed and Lactation Status

Breed of Dam	No. in Herd at Breeding	No. Removed, Reproductive Reasons	No. Removed, Other Reasons	No. in Herd at Calving	No. Calves Born	No. Dead, 36 Hours	No. Dead, 36 Hours to Weaning	No. Sold, etc. Before Weaning	No. Weaned	Percent Cows in Herd at Calving	Percent Cows Calving	Percent Calves Weaned
Angus	1005	126	042	0837	0750	019	12	26	0693	83.3	74.6	69.0
Brahman	0077	012	000	0065	0059	006	02	01	0050	84.4	76.6	64.9
Brangus	0091	015	004	0072	0067	004	03	00	0060	79.1	73.6	65.9
Hereford	1461	127	110	1224	1123	053	25	24	1021	83.8	76.9	69.9
Santa Gertrudis	0077	016	006	0055	0046	002	01	00	0043	71.4	59.7	55.8
Shorthorn	0113	017	000	0096	0071	001	04	00	0066	85.0	62.8	58.4
Crossbreds	0669	054	041	0574	0534	019	12	04	0499	85.8	79.8	74.6
Total Wet:	3493	367	203	2923	2650	104	59	55	3432	83.7	75.9	69.6
Angus	0632	121	060	0451	0371	033	12	09	0317	71.4	58.7	50.2
Brahman	0054	011	001	0042	0037	005	01	02	0029	77.8	68.5	53.7
Brangus	0061	012	000	0049	0048	007	01	02	0038	80.3	78.7	62.3
Hereford	0746	077	030	0639	0521	055	11	11	0444	84.7	69.8	59.5
Santa Gertrudis	0044	004	001	0039	0036	002	00	00	0034	88.6	81.8	77.3
Shorthorn	0135	017	001	0117	0072	010	03	00	0059	86.7	53.8	43.7
Crossbreds	0298	041	009	0248	0216	013	05	02	0196	83.2	72.5	65.8
Total Dry:	1970	283	102	1585	1301	125	33	26	1117	80.5	66.0	56.7
Total:	5463	650	305	4508	3951	229	92	81	3549	82.5	72.3	65.0

APPENDIX TABLE 6. Reproductive Performance of Straightbred Cows in S-10 Project by Method of Breeding

Breed of Sire and Dam	How Bred*	No. in Herd at Breeding	No. Removed, Reproductive Reasons	No. Removed, Other Reasons	No. in Herd at Calving	No. Calves Born	No. Dead, 36 Hours	No. Dead, 36 Hours to Weaning	No. Sold, etc. Before Weaning	No. Weaned	Percent Cows in Herd at Calving	Percent Calves Born	Percent Calves Weaned
Angus	1	0060	006	001	0053	0043	002	01	00	0040	88.3	71.7	66.7
Angus	2	1287	116	091	1080	0973	044	15	35	0879	83.9	75.6	68.3
Angus	3	0290	125	010	0155	0105	006	08	00	0091	53.4	36.2	31.4
Breed Total:		1637	247	102	1288	1121	052	24	35	1010	78.7	68.5	61.7
Brahman	2	0131	023	001	0107	0096	001	03	03	0079	81.7	73.3	60.3
Breed Total:		0131	023	001	0107	0096	001	03	03	0079	81.7	73.3	60.3
Brangus	2	0152	027	004	0121	0115	011	04	02	0098	79.6	75.7	64.5
Breed Total:		0152	027	004	0121	0115	011	04	02	0098	79.6	75.7	64.5
Hereford	1	0058	006	004	0048	0038	000	00	00	0038	82.8	65.5	65.5
Hereford	2	1718	102	124	1492	1396	089	29	35	1243	86.8	81.3	72.4
Hereford	3	0431	096	012	0323	0210	019	07	00	0184	74.9	48.7	42.7
Breed Total:		2207	204	140	1863	1644	108	36	35	1465	84.4	74.5	66.4
Santa Gertrudis	2	0121	020	007	0094	0082	004	01	00	0077	77.7	67.8	63.6
Breed Total:		0121	020	007	0094	0082	004	01	00	0077	77.7	67.8	63.6
Shorthorn	1	0019	001	001	0017	0012	000	00	00	0012	89.5	63.2	63.2
Shorthorn	2	0092	016	000	0076	0073	001	01	00	0071	82.6	79.3	77.2
Shorthorn	3	0137	017	000	0120	0058	010	06	00	0042	87.6	42.3	30.7
Breed Total:		0248	034	001	0213	0143	011	07	00	0125	85.9	57.7	50.4
Total:		4496	555	255	3686	3201	197	75	75	2854	82.0	71.2	63.5

*1 = Hand
2 = Pasture
3 = Artificial Insemination

APPENDIX TABLE 7. Reproductive Performance of Cows in S-10 Project by Breed and Age

Breed of Dam	Age of Dam	No. in Herd at Breeding	No. Removed, Reproductive Reasons	No. Removed, Other Reasons	No. in Herd at Calving	No. Calves Born	No. Dead, 36 Hours	No. Dead, 36 Hours to Weaning	No. Sold, etc. Before Weaning	No. Weaned	Percent Cows in Herd at Calving	Percent Calves Born	Percent Calves Weaned	Percent Cows in Herd at Calving Dropping a Calf
Angus	1	0128	020	024	0084	0066	008	03	02	0053	65.6	51.6	41.4	78.6
Angus	2	0331	048	015	0268	0221	015	03	06	0197	81.0	66.8	59.5	82.5
Angus	3	0285	046	012	0227	0197	011	04	05	0177	79.6	69.1	62.1	86.8
Angus	4	0893	133	051	0709	0637	018	14	22	0583	79.4	71.3	65.3	89.8
Breed Total:		1637	247	102	1288	1121	052	24	35	1010	78.7	68.5	61.7	87.0
Brahman	1	0004	000	000	0004	0001	000	00	00	0001	100.0	25.0	25.0	25.0
Brahman	2	0017	003	000	0014	0014	002	00	02	0010	82.4	82.4	58.8	100.0
Brahman	3	0027	005	000	0022	0022	002	00	00	0020	81.5	81.5	74.1	100.0
Brahman	4	0083	015	001	0067	0059	007	03	01	0048	80.7	71.1	57.8	88.1
Breed Total:		0131	023	001	0107	0096	001	03	03	0079	81.7	73.3	60.3	89.7
Brangus	2	0046	008	000	0038	0037	006	01	00	0030	82.6	80.4	65.2	97.4
Brangus	3	0028	003	000	0025	0024	004	01	00	0019	89.3	85.7	67.9	96.0
Brangus	4	0078	016	004	0058	0054	001	02	02	0049	74.4	69.2	62.8	93.1
Breed Total:		0152	027	004	0121	0115	011	04	02	0098	79.6	75.7	64.5	95.0
Hereford	1	0208	013	008	0187	0150	024	03	02	0121	89.9	73.1	58.2	80.2
Hereford	2	0389	045	017	0327	0274	024	07	07	0236	84.1	70.4	60.7	83.8
Hereford	3	0318	027	034	0257	0219	013	08	05	0193	80.8	68.9	60.7	85.2
Hereford	4	1292	119	081	1092	1001	047	18	21	0915	84.5	77.4	70.8	91.7
Breed Total:		2207	204	140	1863	1644	108	36	35	1465	84.4	74.5	66.4	88.2
Santa Gertrudis	1	0002	000	000	0002	0000	000	00	00	0000	100.0	00.0	00.0	00.0
Santa Gertrudis	2	0036	003	000	0033	0028	002	00	00	0026	91.7	77.8	72.2	84.8
Santa Gertrudis	3	0026	005	002	0019	0017	002	00	00	0015	73.1	65.4	57.7	89.5
Santa Gertrudis	4	0057	012	005	0040	0037	000	01	00	0036	70.2	64.9	63.2	92.5
Breed Total:		0121	020	007	0094	0042	004	01	00	0077	77.7	67.8	63.6	87.2

APPENDIX TABLE 7. Reproductive Performance of Cows in S-10 Project by Breed and Age - Continued

Shorthorn	1	0024	000	000	0024	0009	001	00	00	0008	100.0	37.5	33.3	37.5
Shorthorn	2	0037	000	000	0037	0023	003	01	00	0019	100.0	62.2	51.4	62.2
Shorthorn	3	0046	004	000	0042	0026	003	01	00	0022	91.3	56.5	47.8	61.9
Shorthorn	4	0141	030	001	0110	0085	004	05	00	0076	78.0	60.3	53.9	77.3
Breed Total:		0248	034	001	0213	0143	011	07	00	0125	85.9	57.7	50.4	67.1
Crossbred	1	0031	000	001	0030	0016	002	00	00	0014	96.8	51.6	54.2	53.3
Crossbred	2	0160	014	005	0141	0119	007	02	00	0110	88.1	74.4	68.8	84.4
Crossbred	3	0187	023	009	0155	0145	009	04	00	0132	82.9	77.5	70.6	93.5
Crossbred	4	0589	058	035	0496	0470	014	11	06	0439	84.2	79.8	74.5	94.8
Crossbred Total:		0967	095	050	0822	0750	032	17	06	0695	85.0	77.6	71.9	91.2
Total:		5463	650	305	4508	3951	229	92	81	3549	82.5	72.3	65.0	87.6

APPENDIX TABLE 8. Summary of Calf Losses in the S-10 Project by Breed and Age of Dam

Breed of Dam	Age of Dam	No. Calves Born	No. Dead, 36 Hours	No. Dead, 36 Hours to Weaning	No. Sold, etc. Before Weaning	No. Weaned	Total Lost	Percent Dead, 36 Hours	Percent Dead, 36 Hours to Weaning	Total Percent Lost
Angus	1	0066	008	03	02	0053	11	13.1	4.5	16.7
Brahman	1	0001	000	00	00	0001	00	0.0	0.0	0.0
Hereford	1	0150	024	03	02	0121	27	16.0	2.0	18.0
Santa Gertrudis	1	0000	000	00	00	0000	00	00.0	0.0	00.0
Shorthorn	1	0009	001	00	00	0008	01	11.1	1.0	11.1
Crossbred	1	0016	002	00	00	0014	02	12.5	0.0	12.5
Total (1 yr.):		0242	035	06	04	0197	41	14.5	2.5	16.9
Angus	2	0221	015	03	06	0197	18	6.8	1.4	8.1
Brahman	2	0014	002	00	02	0010	02	14.3	0.0	14.3
Brangus	2	0037	006	01	00	0030	07	16.2	2.7	18.9
Hereford	2	0274	024	07	07	0236	31	8.8	2.6	11.3
Santa Gertrudis	2	0028	002	00	00	0026	02	7.1	0.0	7.1
Shorthorn	2	0023	003	01	00	0019	04	13.0	4.3	17.4
Crossbred	2	0119	007	02	00	0110	09	5.9	1.7	7.6
Total (2 yr.):		0716	059	14	15	0628	73	8.2	2.0	10.2
Angus	3	0197	011	04	05	0177	15	5.6	2.0	7.6
Brahman	3	0022	002	00	00	0020	02	9.1	0.0	9.1
Brangus	3	0024	004	01	00	0019	05	16.7	4.2	20.8
Hereford	3	0219	013	08	05	0193	21	5.9	3.7	9.6
Santa Gertrudis	3	0017	002	00	00	0015	02	11.8	0.0	11.8
Shorthorn	3	0026	003	01	00	0022	04	11.5	3.8	15.4
Crossbred	3	0145	009	04	00	0132	13	6.2	2.8	9.0
Total (3 yr.):		0650	044	18	10	0578	62	6.8	2.8	9.5
Angus	4	0637	018	14	22	0583	32	2.8	2.2	5.0
Brahman	4	0059	007	03	01	0048	10	11.9	5.1	16.9
Brangus	4	0054	001	02	02	0049	03	1.9	3.7	5.6
Hereford	4	1001	047	18	21	0915	65	4.7	1.8	6.5
Santa Gertrudis	4	0037	000	01	00	0036	01	1.0	2.7	2.7
Shorthorn	4	0085	004	05	00	0076	09	4.7	6.9	10.6
Crossbred	4	0470	014	11	06	0439	25	3.0	2.3	5.3
Total (4 yr.):		2343	091	54	52	2146	145	3.9	2.3	6.2
Total:		3951	229	92	81	3549	321	5.8	2.3	8.1